# Paper & Paperboard Testing Program

## Summary Report #2921 S - January 2018

Introduction to the Paper & Paperboard Interlaboratory Program

Explanation of Tables and Definitions of Terms

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| 311 | Tearing Strength - Newsprint |
| 312 | Tearing Strength - Printing Papers |
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| 327 | Tensile Energy Absorption - Printing Papers |
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**The CTS Paper & Paperboard Interlaboratory Program**

In 1969, the National Bureau of Standards (now designated the National Institute for Standards and Technology) and the Technical Association of the Pulp and Paper Industry (TAPPI) developed an interlaboratory program for paper and paperboard testing.  Since 1971, Collaborative Testing Services has operated the Collaborative Reference Program for Paper and Paperboard.  With hundreds of organizations from around the world participating in these tests, this program has become one of the largest of its kind.  The program allows laboratories to compare the performance of their testing with that of other participating laboratories, and provides a realistic picture of the state of paper testing.

**About CTS**

Founded in 1971, Collaborative Testing Services, Inc. (CTS) is a privately - owned company that specializes in interlaboratory tests for a variety of industrial sectors: rubber, plastics, fasteners and metals, CKPG, paper, color and wine, as well as proficiency tests for forensic laboratories.  All of the tests are designed to assist organizations in achieving and maintaining quality assurance objectives. Labs from the U.S., as well as more than 80 countries, currently participate in CTS programs.

If there are any questions on the report or testing program, please contact:

Collaborative Testing Services, Inc.
21331 Gentry Drive
Sterling, Virginia 20166  USA
+1-571-434-1925
FAX #:  +1-571-434-1937
paper@cts-interlab.com

Office Hours:  8:00 a.m. - 4:30 p.m. ET

**WebCode**        Assigned laboratory identification number (temporary) used to ensure lab confidentiality while permitting a lab to locate its data in the Paper Report published on the CTS Website. The WebCode for each analysis can be found on the datasheets and in the Performance Analysis Report mailed to each participant.

**Lab Mean**        The average of the values obtained for each sample by the participant.

**Grand Mean**        The average of the LAB MEANS for all included participants. Laboratories flagged with an X or an M (see DATA FLAG column) are excluded from the GRAND MEAN.

**Difference from**
**Grand Mean**        The difference of the LAB MEAN from the GRAND MEAN.

**Between-Lab**        An indication of the precision of measurement between the laboratories.
**Standard Deviation**        The greater the spread of the LAB MEANS about the GRAND MEAN, the larger the BETWEEN-LAB STANDARD DEVIATION (and vice versa).

**Comparative**        An indication of how well a laboratory's results agree with the other
**Performance Value**        participants. The CPV is a ratio indicating the number of standard deviations from the GRAND MEAN. The closer a laboratory's COMPARATIVE PERFORMANCE VALUE is to zero, the more consistent its results are with the other participants' data (and vice versa). The critical value for each CPV will vary depending on the number of labs participating in a test.

**Inst Code**        A code indicating the manufacturer of the instrument used to perform the test (see separate INSTRUMENT CODE LIST for each test section), if instruments are tracked.

**Data Flag**        DATA FLAGS are assigned based on the simultaneous analysis of both samples tested. Refer to the following chart for an explanation of each symbol:

| DATA FLAG | STATISTICALLY INCLUDED/EXCLUDED | ACTION REQUIRED |
|---|---|---|
| * | INCLUDED | **CAUTION - review testing procedure and monitor future results. Results fall outside 95% ellipse but within a 99% ellipse that is calculated but not drawn.** |
| X | EXCLUDED | **STOP - immediate review of data and/or testing procedure is required. Results fall outside the 99% ellipse. See specific notes following each table for more information on why the data is excluded.** |
| M | EXCLUDED | **PROCEED - lab was unable to report data for at least one sample.** |

**Graph** - For each laboratory, the LAB MEAN for the first sample (x-axis) is plotted against the LAB MEAN for the second sample (y-axis) with each point representing a laboratory. The horizontal and vertical cross-hairs are the GRAND MEANS for each sample. When 20 or more laboratories are in the statistics, an ellipse is also drawn so that 95% of the time a randomly selected laboratory will be included inside the ellipse. Plotted data flags are explained on the previous page.

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### Common Problems Highlighted in Footnotes

1.  *Extreme data* - The laboratory's results for one or both samples are so inconsistent with those of the other participants that the lab mean(s) fall outside the plot.  The participant is advised to immediately review his data and/or testing procedure.

2.  *Systematic bias* - The laboratory's results are either consistently high or low for both samples when compared to the other participants (the plotted point falls near the top or bottom of the ellipse). This indicates that the participant is performing the test with a constant bias. Causes of systematic errors include improper calibration, the particular make/model of equipment or a modification to the testing procedure.

3.  *Inconsistency in testing between samples/sample sets* - The laboratory's results indicate that there are differences in the way the two samples tested (the plotted point falls to the side of the ellipse). This type of error may be attributed to the analyst deviating from the procedure when testing one of the samples or a material interaction occurrence with the instrument or room conditions. The inconsistency is reflected in the CPVs for the two samples, such as a +1.5 CPV for sample A and a -2.2 CPV for sample B. CTS also will specify if the laboratory's data for one sample are high/low compared to the other participants. If this inconsistency is slight, the lab's plotted point will be an * that falls on the edge of the ellipse.

4.  *Inconsistency in testing within a sample* - The laboratory's within-lab standard deviation for a specified sample is high when compared to the other participants, often causing the lab's plotted point to fall outside of the ellipse.

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Labs flagged with an * are not typically included in the footnotes of a data table. These labs may locate their position in the control ellipse and use the definitions above to help identify the type of testing error. An * should serve as a caution flag, a "yellow light", to a lab. If this error is repeated in future rounds, a lab may need to stop and review its testing procedures.  The initial data flag is not cause for alarm. Interlaboratory tests conducted at regular intervals permit a lab to recognize trends in testing.

# Paper & Paperboard Interlaboratory Testing Program
## Analysis 305
## Bursting Strength - Printing Papers
### TAPPI Official Test Method T403

**Report #2921S, January 2018**

|  |  | Sample SA51 | | | Sample SA52 | | |
|---|---|---|---|---|---|---|---|
| WebCode | Data Flag | Lab Mean | Diff from Grand Mean | CPV | Lab Mean | Diff from Grand Mean | CPV |
| 4U9N6B | | 28.72 | 2.17 | 0.83 | 23.72 | 2.18 | 1.01 |
| 62KB9C | | 26.01 | -0.54 | -0.21 | 22.17 | 0.62 | 0.29 |
| 82UZKM | | 28.50 | 1.96 | 0.75 | 23.30 | 1.76 | 0.82 |
| 9MTKZJ | | 27.21 | 0.67 | 0.26 | 21.83 | 0.29 | 0.13 |
| A4UP3M | | 24.13 | -2.41 | -0.92 | 19.98 | -1.56 | -0.73 |
| BJ6VQQ | | 29.94 | 3.40 | 1.30 | 23.91 | 2.37 | 1.10 |
| BX26DW | | 30.60 | 4.06 | 1.55 | 25.09 | 3.54 | 1.65 |
| CJVHFZ | | 21.83 | -4.72 | -1.80 | 17.30 | -4.24 | -1.98 |
| DEMKEY | | 28.04 | 1.49 | 0.57 | 22.38 | 0.84 | 0.39 |
| GAVELD | | 29.00 | 2.46 | 0.94 | 23.80 | 2.26 | 1.05 |
| HHLG3F | | 27.52 | 0.98 | 0.37 | 22.34 | 0.80 | 0.37 |
| K8EGH7 | | 28.43 | 1.88 | 0.72 | 23.24 | 1.69 | 0.79 |
| L98KYK | | 23.80 | -2.74 | -1.05 | 19.55 | -1.99 | -0.93 |
| MTUF3R | | 23.30 | -3.24 | -1.24 | 18.80 | -2.74 | -1.28 |
| MU6BTP | | 27.82 | 1.28 | 0.49 | 22.36 | 0.82 | 0.38 |
| NGTGJK | * | 26.30 | -0.24 | -0.09 | 20.10 | -1.44 | -0.67 |
| PDN7A3 | | 24.98 | -1.57 | -0.60 | 20.10 | -1.44 | -0.67 |
| UA7VXT | | 26.85 | 0.31 | 0.12 | 22.17 | 0.63 | 0.29 |
| VGNPC3 | | 20.97 | -5.57 | -2.13 | 17.48 | -4.07 | -1.89 |
| VHNE4E | | 24.56 | -1.98 | -0.76 | 19.97 | -1.57 | -0.73 |
| VUBX93 | | 26.12 | -0.42 | -0.16 | 20.76 | -0.79 | -0.37 |
| WLZTZJ | X | 25.65 | -0.89 | -0.34 | 24.35 | 2.81 | 1.31 |
| XALXHY | | 29.35 | 2.81 | 1.07 | 23.61 | 2.06 | 0.96 |

| Summary Statistics | Sample SA51 | Sample SA52 |
|---|---|---|
| **Grand Means** | 26.54 psi | 21.54 psi |
| **Stnd Dev Btwn Labs** | 2.61 psi | 2.15 psi |

Statistics based on 22 of 23 reporting participants.

## Comments on Assigned Data Flags for Test #305

WLZTZJ (X) - Inconsistent in testing between samples.

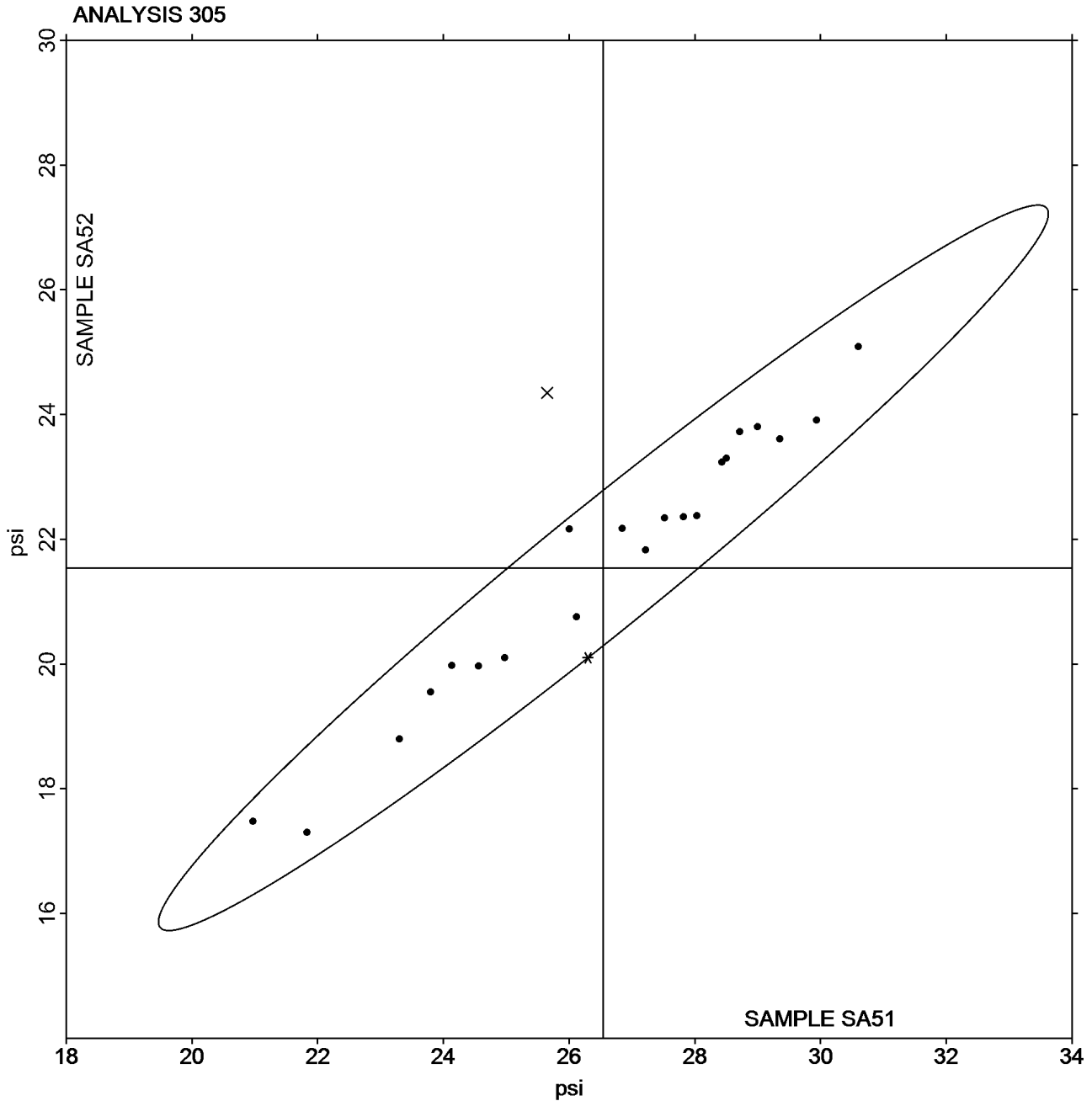**Paper & Paperboard Interlaboratory Testing Program**
**Analysis 305**
**Bursting Strength - Printing Papers**
**TAPPI Official Test Method T403**

**Report #2921S,
January 2018**

**Grand Mean Sample SA51 = 26.544 psi**

**Grand Mean Sample SA52 = 21.543 psi**

# Paper & Paperboard Interlaboratory Testing Program
## Analysis 310
### Bursting Strength -  Packaging Papers
#### TAPPI Official Test Method T403

|         |      | Sample SB51 | | | Sample SB52 | | |
| WebCode | Data Flag | Lab Mean | Diff from Grand Mean | CPV | Lab Mean | Diff from Grand Mean | CPV |
|---------|------|----------|---------------------|-----|----------|---------------------|-----|
| 62KB9C |   | 84.42 | 0.16 | 0.03 | 92.37 | 1.43 | 0.33 |
| 6ETWUP | X | 99.26 | 15.00 | 2.93 | 99.77 | 8.83 | 2.07 |
| 6PQX9F |   | 77.48 | -6.78 | -1.32 | 90.16 | -0.78 | -0.18 |
| 8E4NLX |   | 72.10 | -12.16 | -2.37 | 82.90 | -8.04 | -1.88 |
| 8PL4J7 | * | 92.20 | 7.94 | 1.55 | 89.00 | -1.94 | -0.45 |
| AYH22P |   | 85.65 | 1.39 | 0.27 | 91.19 | 0.25 | 0.06 |
| BX26DW |   | 85.36 | 1.10 | 0.22 | 92.56 | 1.63 | 0.38 |
| CA9CPM |   | 88.70 | 4.44 | 0.87 | 96.58 | 5.64 | 1.32 |
| CZN46Z |   | 84.00 | -0.26 | -0.05 | 90.10 | -0.84 | -0.20 |
| DEMKEY |   | 80.32 | -3.94 | -0.77 | 87.05 | -3.88 | -0.91 |
| E4GX2R |   | 88.10 | 3.83 | 0.75 | 92.14 | 1.20 | 0.28 |
| EXT3E3 |   | 79.84 | -4.42 | -0.86 | 89.19 | -1.75 | -0.41 |
| GJL7UR |   | 93.75 | 9.49 | 1.85 | 96.90 | 5.96 | 1.40 |
| GXK27X |   | 89.17 | 4.91 | 0.96 | 91.20 | 0.26 | 0.06 |
| J3A8UY |   | 87.26 | 3.00 | 0.58 | 93.64 | 2.70 | 0.63 |
| KMUHEW |   | 94.00 | 9.74 | 1.90 | 100.10 | 9.16 | 2.15 |
| LNZ79T | X | 69.63 | -14.63 | -2.85 | 74.51 | -16.43 | -3.85 |
| MBP9NP |   | 85.65 | 1.38 | 0.27 | 96.02 | 5.08 | 1.19 |
| MMHR3V |   | 78.10 | -6.16 | -1.20 | 87.70 | -3.24 | -0.76 |
| MVZ4FW |   | 79.77 | -4.49 | -0.88 | 85.89 | -5.05 | -1.18 |
| NGTGJK |   | 84.69 | 0.43 | 0.08 | 95.34 | 4.40 | 1.03 |
| NT43RJ |   | 85.25 | 0.99 | 0.19 | 90.40 | -0.53 | -0.13 |
| QAKT23 |   | 82.76 | -1.50 | -0.29 | 86.60 | -4.34 | -1.02 |
| RJ4LRP |   | 81.37 | -2.89 | -0.56 | 92.38 | 1.44 | 0.34 |
| RZGXKJ |   | 88.76 | 4.50 | 0.88 | 94.13 | 3.19 | 0.75 |
| TZNWUH |   | 82.35 | -1.91 | -0.37 | 83.75 | -7.19 | -1.68 |
| VUCP6P |   | 83.30 | -0.96 | -0.19 | 95.10 | 4.16 | 0.97 |
| WWWW6D |   | 78.31 | -5.95 | -1.16 | 86.33 | -4.61 | -1.08 |
| XX3QDH |   | 82.40 | -1.86 | -0.36 | 86.60 | -4.34 | -1.02 |

| Summary Statistics | Sample SB51 | Sample SB52 |
|--------------------|-------------|-------------|
| **Grand Means** | 84.26 psi | 90.94 psi |
| **Stnd Dev Btwn Labs** | 5.13 psi | 4.27 psi |

Statistics based on 27 of  29 reporting participants.

## Comments on Assigned Data Flags for Test #310

6ETWUP (X) -  Data for sample SB51 are high.

LNZ79T (X) -  Data for both samples are low.

# Paper & Paperboard Interlaboratory Testing Program
## Analysis 310
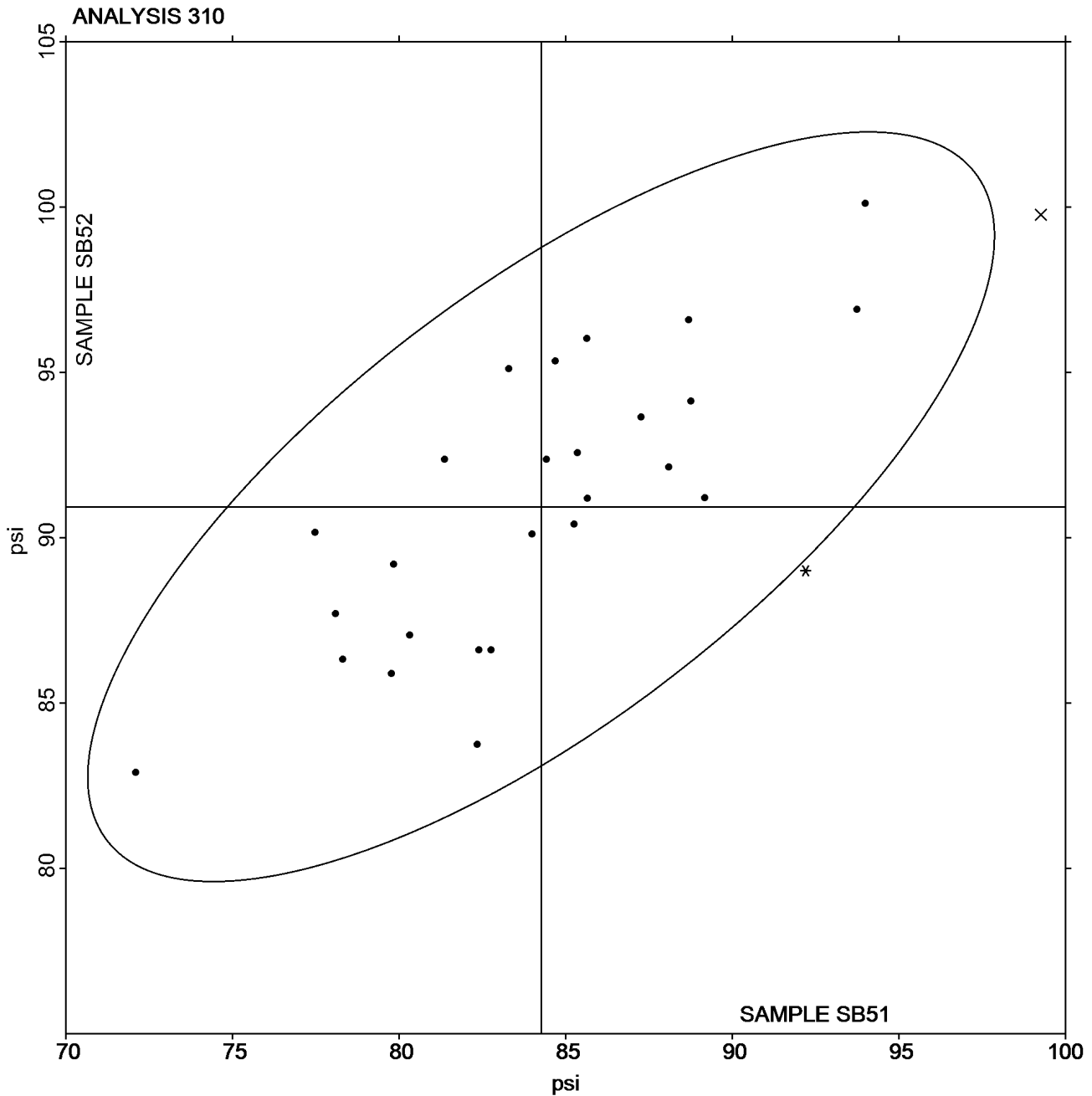## Bursting Strength -  Packaging Papers
## TAPPI Official Test Method T403

**Report #2921S,
January 2018**

**Grand Mean Sample SB51 = 84.261
psi**

**Grand Mean Sample SB52 = 90.937
psi**



ANALYSIS 310

SAMPLE SB52

SAMPLE SB51

psi

psi

# Paper & Paperboard Interlaboratory Testing Program
## Analysis 311
## Tearing Strength - Newsprint
### TAPPI Official Test Method T414

Report #2921S,
January 2018

| WebCode | Data Flag | Sample SK51 | | | Sample SK52 | | |
|---|---|---|---|---|---|---|---|
| | | Lab Mean | Diff from Grand Mean | CPV | Lab Mean | Diff from Grand Mean | CPV |
| 62KB9C | | 20.92 | -1.27 | -0.45 | 20.19 | -0.71 | -0.23 |
| BEVKL4 | | 25.47 | 3.28 | 1.16 | 24.45 | 3.55 | 1.16 |
| BJ6VQQ | | 20.08 | -2.11 | -0.74 | 18.16 | -2.74 | -0.90 |
| MJLYER | | 26.16 | 3.97 | 1.40 | 25.02 | 4.12 | 1.35 |
| MTTLFF | | 19.94 | -2.25 | -0.79 | 18.43 | -2.47 | -0.81 |
| TGFMXR | | 20.57 | -1.62 | -0.57 | 19.16 | -1.74 | -0.57 |

| Summary Statistics | Sample SK51 | Sample SK52 |
|---|---|---|
| Grand Means | 22.19 Grams | 20.90 Grams |
| Stnd Dev Btwn Labs | 2.84 Grams | 3.06 Grams |

Statistics based on 6 of 6 reporting participants.

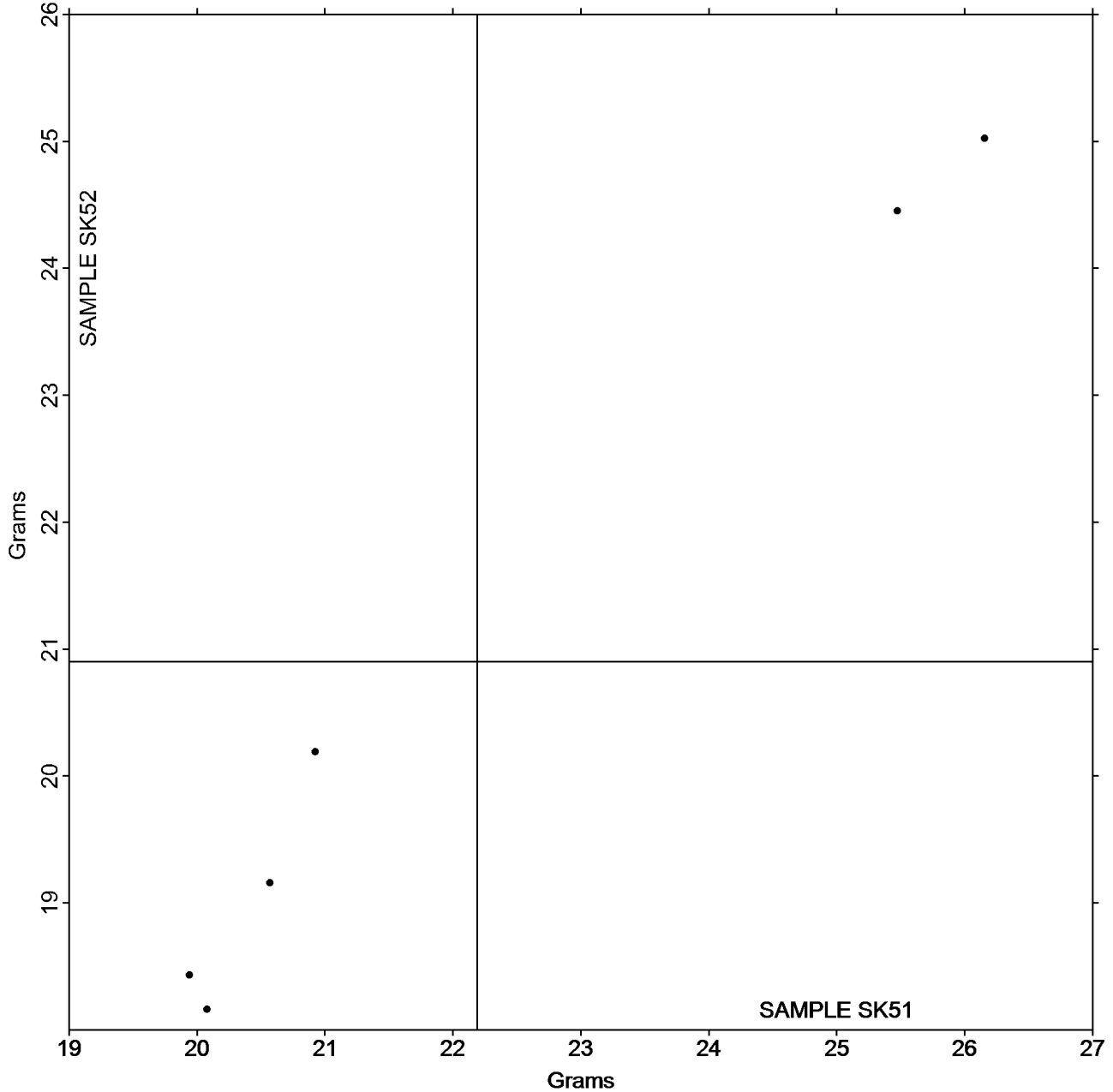**Paper & Paperboard Interlaboratory Testing Program**
**Analysis 311**
**Tearing Strength - Newsprint**
**TAPPI Official Test Method T414**

**Report #2921S,**
**January 2018**

**Grand Mean Sample SK51 = 22.191 Grams**

**Grand Mean Sample SK52 = 20.903 Grams**

ANALYSIS 311



If fewer than 20 laboratories are included in an analysis, a control ellipse will not be drawn on the two-sample plot.

# Paper & Paperboard Interlaboratory Testing Program
## Analysis 312
### Tearing Strength - Printing Papers
#### TAPPI Official Test Method T414

**Report #2921S, January 2018**

|  |  | Sample SC51 | | | Sample SC52 | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| WebCode | Data Flag | Lab Mean | Diff from Grand Mean | CPV | Lab Mean | Diff from Grand Mean | CPV |
| 28ZK9H | * | 60.56 | -1.81 | -0.52 | 65.77 | 3.57 | 1.02 |
| 2PK9FT |  | 54.80 | -7.57 | -2.19 | 56.70 | -5.50 | -1.57 |
| 33P3B2 |  | 57.42 | -4.95 | -1.43 | 55.81 | -6.39 | -1.83 |
| 3HYM2E |  | 63.20 | 0.83 | 0.24 | 61.78 | -0.42 | -0.12 |
| 4U9N6B |  | 66.15 | 3.78 | 1.09 | 67.76 | 5.56 | 1.59 |
| 62KB9C |  | 64.51 | 2.14 | 0.62 | 64.15 | 1.95 | 0.56 |
| 6AHWL6 |  | 63.00 | 0.63 | 0.18 | 62.80 | 0.60 | 0.17 |
| 82UZKM |  | 64.14 | 1.77 | 0.51 | 64.86 | 2.66 | 0.76 |
| 8N7VEC |  | 61.70 | -0.67 | -0.19 | 62.00 | -0.20 | -0.06 |
| 8V3RZT | X | 122.44 | 60.07 | 17.39 | 120.30 | 58.10 | 16.61 |
| 9MTKZJ |  | 55.17 | -7.20 | -2.09 | 55.60 | -6.60 | -1.89 |
| A4UP3M |  | 61.90 | -0.47 | -0.14 | 59.23 | -2.97 | -0.85 |
| AYH22P |  | 59.75 | -2.62 | -0.76 | 61.00 | -1.20 | -0.34 |
| BX26DW |  | 62.77 | 0.39 | 0.11 | 61.66 | -0.54 | -0.15 |
| C22NZV |  | 64.26 | 1.89 | 0.55 | 62.92 | 0.72 | 0.21 |
| CJVHFZ |  | 65.40 | 3.03 | 0.88 | 63.60 | 1.40 | 0.40 |
| CZN46Z |  | 57.48 | -4.89 | -1.42 | 58.47 | -3.73 | -1.07 |
| DEMKEY |  | 61.55 | -0.82 | -0.24 | 63.06 | 0.86 | 0.25 |
| F9M34C |  | 56.40 | -5.97 | -1.73 | 57.36 | -4.84 | -1.38 |
| GAVELD | X | 74.78 | 12.41 | 3.59 | 73.80 | 11.60 | 3.32 |
| H6ZTFW |  | 60.40 | -1.97 | -0.57 | 63.80 | 1.60 | 0.46 |
| HP6KC3 | * | 71.04 | 8.67 | 2.51 | 68.78 | 6.58 | 1.88 |
| HU32MC | * | 66.22 | 3.85 | 1.11 | 70.06 | 7.86 | 2.25 |
| J8JEDC | X | 45.16 | -17.21 | -4.98 | 46.32 | -15.88 | -4.54 |
| JQYQ73 |  | 58.04 | -4.33 | -1.25 | 58.84 | -3.36 | -0.96 |
| K8EGH7 |  | 64.33 | 1.96 | 0.57 | 62.13 | -0.07 | -0.02 |
| KPGAAZ |  | 60.62 | -1.75 | -0.51 | 59.98 | -2.22 | -0.63 |
| KPXA9V |  | 58.30 | -4.07 | -1.18 | 58.68 | -3.52 | -1.01 |
| MBP9NP |  | 65.70 | 3.33 | 0.96 | 65.47 | 3.27 | 0.94 |
| MTUF3R | X | 72.56 | 10.19 | 2.95 | 67.04 | 4.84 | 1.38 |
| MU6BTP |  | 65.30 | 2.93 | 0.85 | 64.85 | 2.65 | 0.76 |
| N6WDFQ |  | 63.70 | 1.33 | 0.38 | 62.12 | -0.08 | -0.02 |
| NT43RJ |  | 65.02 | 2.65 | 0.77 | 64.12 | 1.92 | 0.55 |
| NUYGMP |  | 65.30 | 2.93 | 0.85 | 65.38 | 3.18 | 0.91 |
| PDN7A3 |  | 63.02 | 0.65 | 0.19 | 63.21 | 1.01 | 0.29 |
| QAKT23 |  | 65.31 | 2.94 | 0.85 | 64.59 | 2.39 | 0.68 |
| R69427 |  | 61.17 | -1.20 | -0.35 | 61.25 | -0.95 | -0.27 |
| RHCP7G |  | 61.90 | -0.47 | -0.14 | 61.72 | -0.48 | -0.14 |
| RJ4LRP |  | 65.04 | 2.67 | 0.77 | 63.51 | 1.31 | 0.37 |
| TZNWUH |  | 56.70 | -5.67 | -1.64 | 56.04 | -6.16 | -1.76 |

# Paper & Paperboard Interlaboratory Testing Program
## Analysis 312
### Tearing Strength - Printing Papers
### TAPPI Official Test Method T414

**Report #2921S, January 2018**

| WebCode | Data Flag | Sample SC51 Lab Mean | Diff from Grand Mean | CPV | Sample SC52 Lab Mean | Diff from Grand Mean | CPV |
|---------|-----------|----------|----------------------|------|----------|----------------------|------|
| UA7VXT  |  | 64.20 | 1.83 | 0.53 | 64.80 | 2.60 | 0.74 |
| V4ZK47  |  | 65.34 | 2.97 | 0.86 | 63.28 | 1.08 | 0.31 |
| VGNPC3  |  | 67.11 | 4.74 | 1.37 | 66.23 | 4.03 | 1.15 |
| VHNE4E  |  | 61.48 | -0.89 | -0.26 | 61.12 | -1.08 | -0.31 |
| WLZTZJ  |  | 63.13 | 0.76 | 0.22 | 62.20 | 0.00 | 0.00 |
| WWWW6D  |  | 64.81 | 2.44 | 0.71 | 65.45 | 3.25 | 0.93 |
| XALXHY  |  | 58.52 | -3.85 | -1.12 | 56.24 | -5.96 | -1.70 |
| ZH834V  |  | 63.90 | 1.53 | 0.44 | 63.68 | 1.48 | 0.42 |
| ZYTNLZ  |  | 60.99 | -1.38 | -0.40 | 56.85 | -5.35 | -1.53 |

| Summary Statistics | Sample SC51 | Sample SC52 |
|--------------------|-------------|-------------|
| **Grand Means** | 62.37 Grams | 62.20 Grams |
| **Stnd Dev Btwn Labs** | 3.45 Grams | 3.50 Grams |

Statistics based on 45 of 49 reporting participants.

## Comments on Assigned Data Flags for Test #312

J8JEDC (X) - Data for both samples are low. Possible Systematic Error.

GAVELD (X) - Data for both samples are high. Possible Systematic Error. Inconsistent within the determinations of sample SC51.

8V3RZT (X) - Extreme Data.

MTUF3R (X) - Data for sample SC51 are high. Inconsistent within the determinations of both samples.

**Paper & Paperboard Interlaboratory Testing Program**
**Analysis 312**
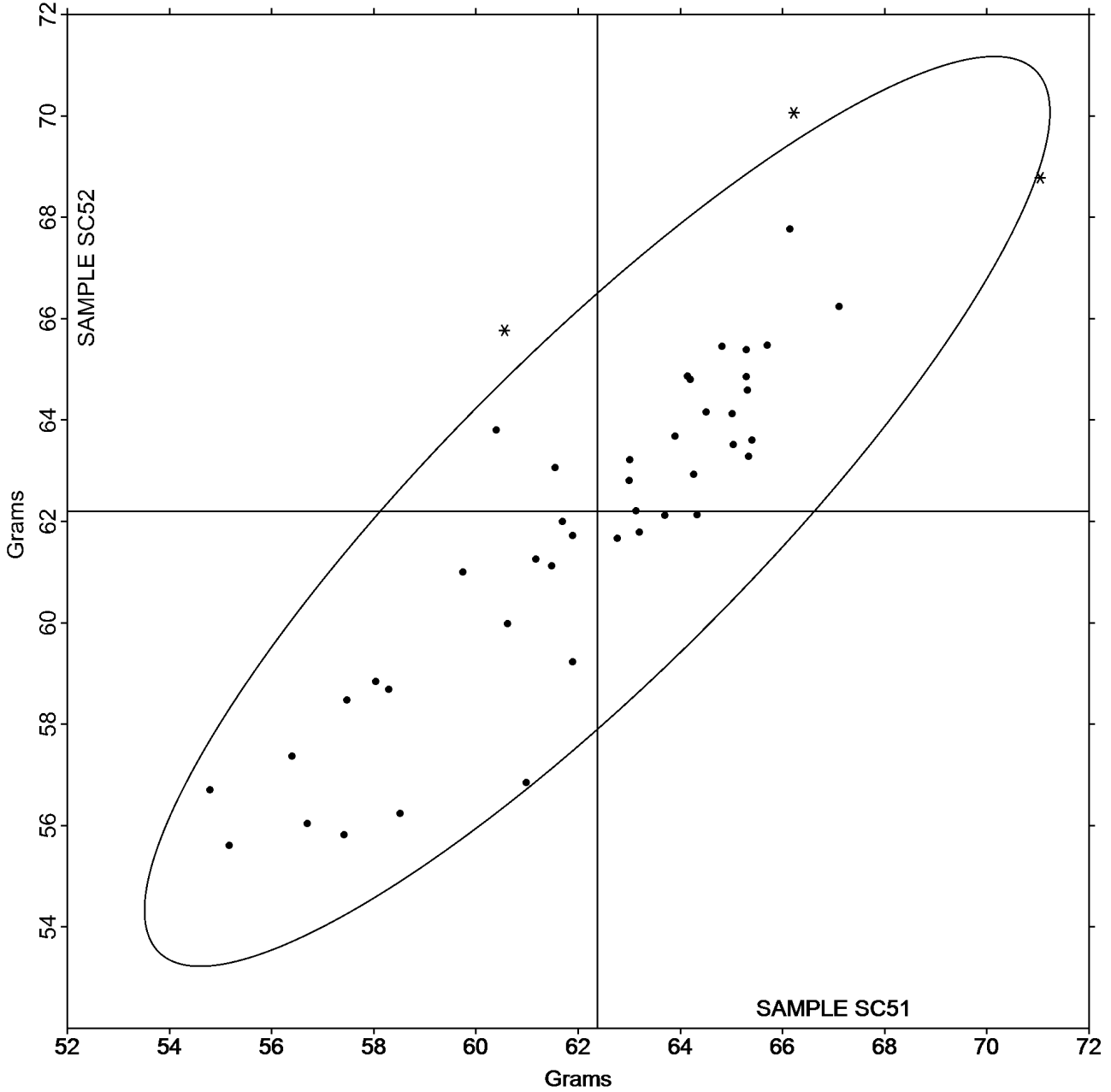**Tearing Strength - Printing Papers**
**TAPPI Official Test Method T414**

**Report #2921S,**
**January 2018**

**Grand Mean Sample SC51 = 62.372 Grams**

**Grand Mean Sample SC52 = 62.198 Grams**



ANALYSIS 312

SAMPLE SC52

Grams

SAMPLE SC51

Grams

| WebCode | Data Flag | Sample SD51 | | | Sample SD52 | | |
|---|---|---|---|---|---|---|---|
| | | Lab Mean | Diff from Grand Mean | CPV | Lab Mean | Diff from Grand Mean | CPV |
| 3DYPBL | | 178.6 | -6.8 | -0.38 | 177.1 | -8.6 | -0.54 |
| 62KB9C | | 186.0 | 0.6 | 0.03 | 191.7 | 6.0 | 0.38 |
| 6ETWUP | | 197.7 | 12.3 | 0.69 | 199.3 | 13.6 | 0.86 |
| 7AWF63 | | 170.6 | -14.8 | -0.82 | 173.9 | -11.8 | -0.75 |
| 7DUY82 | | 202.2 | 16.8 | 0.94 | 196.0 | 10.3 | 0.66 |
| 8E4NLX | | 199.0 | 13.6 | 0.76 | 194.6 | 8.9 | 0.56 |
| 8PL4J7 | | 173.2 | -12.2 | -0.68 | 174.4 | -11.3 | -0.72 |
| AGJPVA | X | 139.4 | -46.0 | -2.57 | 132.8 | -52.9 | -3.36 |
| BM2ETP | | 189.0 | 3.5 | 0.20 | 188.0 | 2.3 | 0.14 |
| BRBV2D | | 181.6 | -3.8 | -0.21 | 182.8 | -2.9 | -0.19 |
| CA9CPM | | 180.8 | -4.6 | -0.26 | 171.9 | -13.8 | -0.87 |
| DMD4UT | | 196.5 | 11.1 | 0.62 | 197.0 | 11.3 | 0.72 |
| E4GX2R | | 194.2 | 8.7 | 0.49 | 201.8 | 16.1 | 1.02 |
| E6RQTL | | 175.4 | -10.0 | -0.56 | 164.4 | -21.2 | -1.35 |
| EXT3E3 | | 193.1 | 7.7 | 0.43 | 198.1 | 12.5 | 0.79 |
| FC2KF2 | * | 234.0 | 48.6 | 2.71 | 219.3 | 33.6 | 2.14 |
| GAVELD | | 192.9 | 7.5 | 0.42 | 196.8 | 11.1 | 0.70 |
| GXK27X | | 173.8 | -11.6 | -0.65 | 162.2 | -23.5 | -1.49 |
| HP6KC3 | | 175.8 | -9.6 | -0.53 | 186.4 | 0.7 | 0.04 |
| J2VWYZ | | 203.2 | 17.8 | 0.99 | 199.2 | 13.5 | 0.86 |
| J3A8UY | * | 220.6 | 35.2 | 1.97 | 200.6 | 14.9 | 0.95 |
| JAQMTN | | 195.9 | 10.5 | 0.58 | 203.9 | 18.3 | 1.16 |
| L724FV | | 174.1 | -11.3 | -0.63 | 177.7 | -8.0 | -0.51 |
| L98KYK | | 183.6 | -1.8 | -0.10 | 182.9 | -2.8 | -0.17 |
| LDJHFF | | 164.8 | -20.6 | -1.15 | 170.0 | -15.7 | -1.00 |
| MMHR3V | | 199.8 | 14.4 | 0.80 | 202.0 | 16.3 | 1.04 |
| MVZ4FW | | 182.0 | -3.4 | -0.19 | 182.6 | -3.1 | -0.20 |
| NGTGJK | | 147.2 | -38.2 | -2.13 | 155.2 | -30.5 | -1.94 |
| Q3LC8N | | 184.2 | -1.2 | -0.07 | 188.7 | 3.1 | 0.19 |
| Q6ATTH | | 198.7 | 13.3 | 0.74 | 207.8 | 22.1 | 1.40 |
| QUT7JH | | 168.5 | -16.9 | -0.94 | 172.6 | -13.1 | -0.83 |
| RZGXKJ | | 182.8 | -2.6 | -0.15 | 184.9 | -0.8 | -0.05 |
| T23C8J | | 176.3 | -9.1 | -0.51 | 174.7 | -11.0 | -0.70 |
| TCZ23Y | | 170.8 | -14.7 | -0.82 | 163.4 | -22.3 | -1.42 |
| UYGR3F | | 164.7 | -20.7 | -1.16 | 177.6 | -8.1 | -0.51 |
| VUCP6P | | 195.9 | 10.5 | 0.59 | 194.0 | 8.3 | 0.53 |
| XLVLJ9 | | 208.6 | 23.2 | 1.30 | 204.8 | 19.1 | 1.21 |
| XX3QDH | X | 22.7 | -162.7 | -9.09 | 20.7 | -165.0 | -10.48 |
| YH8MAJ | | 144.0 | -41.4 | -2.31 | 152.0 | -33.7 | -2.14 |

# Paper & Paperboard Interlaboratory Testing Program
## Analysis 314
## Tearing Strength - Packaging Papers
## TAPPI Official Test Method T414

**Report #2921S,**
**January 2018**

| Summary Statistics | Sample SD51 | Sample SD52 |
|---|---|---|
| **Grand Means** | 185.41 Grams | 185.67 Grams |
| **Stnd Dev Btwn Labs** | 17.90 Grams | 15.75 Grams |

Statistics based on 37 of 39 reporting participants.

## Comments on Assigned Data Flags for Test #314

AGJPVA (X) -  Data for sample SD52 are low.

XX3QDH (X) -  Extreme Data.

**Paper & Paperboard Interlaboratory Testing Program**
**Analysis 314**
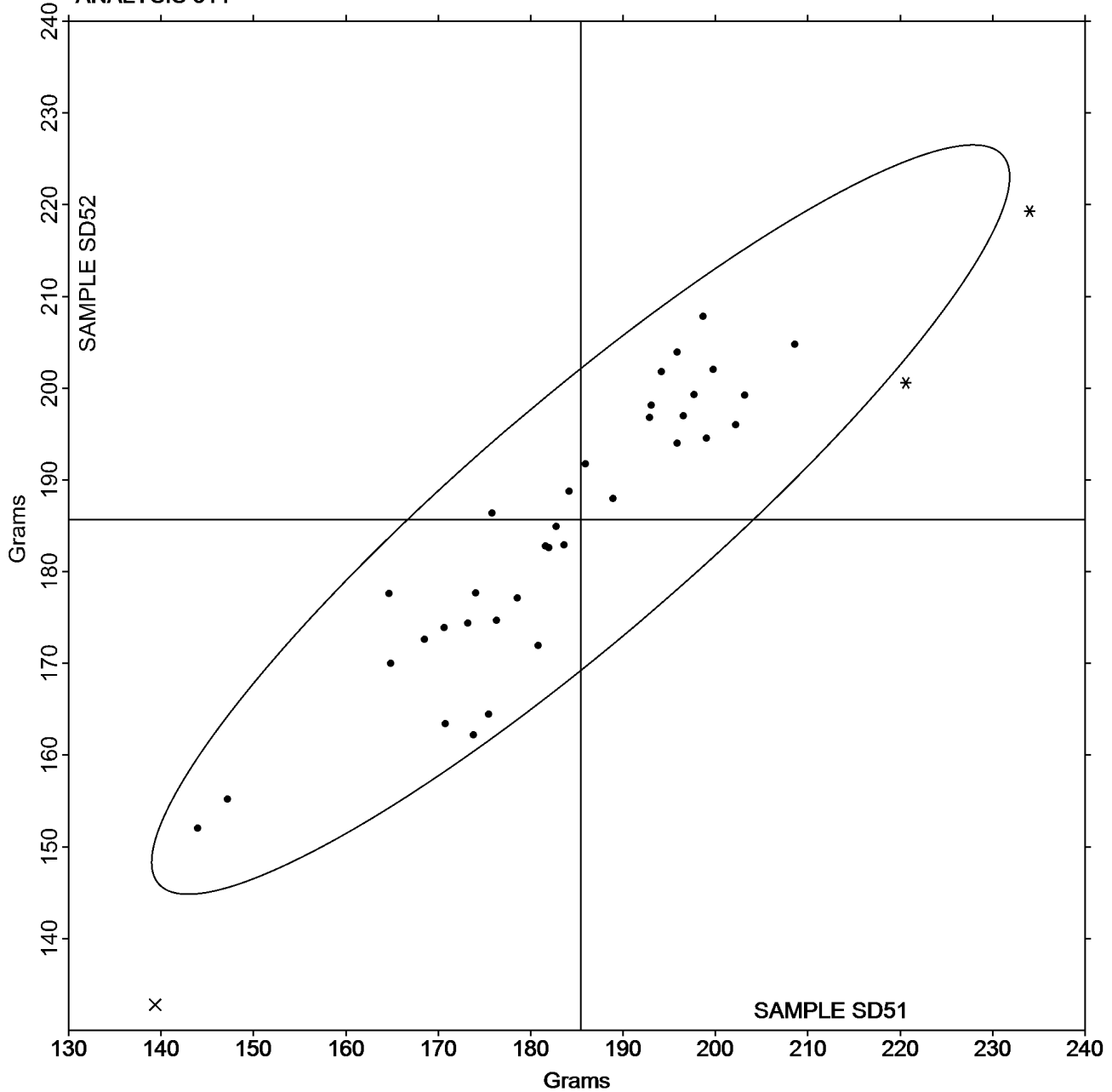**Tearing Strength - Packaging Papers**
**TAPPI Official Test Method T414**

**Report #2921S,**
**January 2018**

**Grand Mean Sample SD51 = 185.41 Grams**

**Grand Mean Sample SD52 = 185.67 Grams**



ANALYSIS 314

SAMPLE SD52

Grams

SAMPLE SD51

Grams

# Paper & Paperboard Interlaboratory Testing Program
## Analysis 320
### Tensile Breaking Strength - Newsprint
### TAPPI Official Test Method T494

**Report #2921S, January 2018**

| WebCode | Data Flag | Sample SR51 | | | Sample SR52 | | |
|---|---|---|---|---|---|---|---|
| | | Lab Mean | Diff from Grand Mean | CPV | Lab Mean | Diff from Grand Mean | CPV |
| BEVKL4 | | 2.091 | -0.036 | -0.34 | 2.241 | 0.034 | 0.40 |
| BJ6VQQ | | 2.327 | 0.200 | 1.88 | 2.284 | 0.077 | 0.90 |
| DEMKEY | | 2.091 | -0.036 | -0.34 | 2.206 | -0.001 | -0.01 |
| HHLG3F | | 1.985 | -0.142 | -1.33 | 2.074 | -0.133 | -1.56 |
| HP6KC3 | | 2.178 | 0.051 | 0.48 | 2.223 | 0.016 | 0.18 |
| KMUHEW | | 2.219 | 0.092 | 0.87 | 2.249 | 0.042 | 0.50 |
| MJLYER | | 2.094 | -0.033 | -0.31 | 2.263 | 0.056 | 0.65 |
| MTTLFF | | 2.115 | -0.012 | -0.11 | 2.206 | -0.001 | -0.01 |
| TCJUXH | | 1.962 | -0.165 | -1.54 | 2.023 | -0.185 | -2.16 |
| TGFMXR | | 2.102 | -0.025 | -0.23 | 2.208 | 0.001 | 0.02 |
| UA7VXT | | 2.232 | 0.105 | 0.98 | 2.301 | 0.094 | 1.10 |

| Summary Statistics | Sample SR51 | Sample SR52 |
|---|---|---|
| Grand Means | 2.13 kN/m | 2.21 kN/m |
| Stnd Dev Btwn Labs | 0.11 kN/m | 0.09 kN/m |

Statistics based on 11 of 11 reporting participants.

**Paper & Paperboard Interlaboratory Testing Program**
Analysis 320
**Tensile Breaking Strength - Newsprint**
**TAPPI Official Test Method T494**

**Report #2921S,
January 2018**

**Grand Mean Sample SR51 = 2.1270 kN/m**

**Grand Mean Sample SR52 = 2.2070 kN/m**



If fewer than 20 laboratories are included in an analysis, a control ellipse will not be drawn on the two-sample plot.

**Paper & Paperboard Interlaboratory Testing Program**
**Analysis 321**
**Tensile Energy Absorption  - Newsprint**
**TAPPI Official Test Method T494**

**Report #2921S,**
**January 2018**

| WebCode | Data Flag | Sample SR51 | | | Sample SR52 | | |
|---|---|---|---|---|---|---|---|
| | | Lab Mean | Diff from Grand Mean | CPV | Lab Mean | Diff from Grand Mean | CPV |
| BEVKL4 | | 12.83 | -1.09 | -0.76 | 15.68 | 0.79 | 0.42 |
| BJ6VQQ | | 15.83 | 1.91 | 1.34 | 14.29 | -0.60 | -0.32 |
| DEMKEY | | 13.09 | -0.83 | -0.58 | 14.93 | 0.04 | 0.02 |
| HHLG3F | | 11.82 | -2.11 | -1.48 | 12.97 | -1.92 | -1.01 |
| HP6KC3 | | 15.50 | 1.58 | 1.10 | 16.32 | 1.43 | 0.75 |
| KMUHEW | | 13.87 | -0.06 | -0.04 | 14.21 | -0.68 | -0.36 |
| MJLYER | | 13.23 | -0.70 | -0.49 | 15.65 | 0.76 | 0.40 |
| MTTLFF | | 14.63 | 0.70 | 0.49 | 15.61 | 0.72 | 0.38 |
| TCJUXH | | 15.76 | 1.84 | 1.29 | 18.10 | 3.21 | 1.68 |
| UA7VXT | | 12.68 | -1.24 | -0.87 | 11.14 | -3.75 | -1.97 |

| Summary Statistics | Sample SR51 | Sample SR52 |
|---|---|---|
| **Grand Means** | 13.92 Joules/sq m | 14.89 Joules/sq m |
| **Stnd Dev Btwn Labs** | 1.43 Joules/sq m | 1.90 Joules/sq m |

Statistics based on 10 of  10 reporting participants.

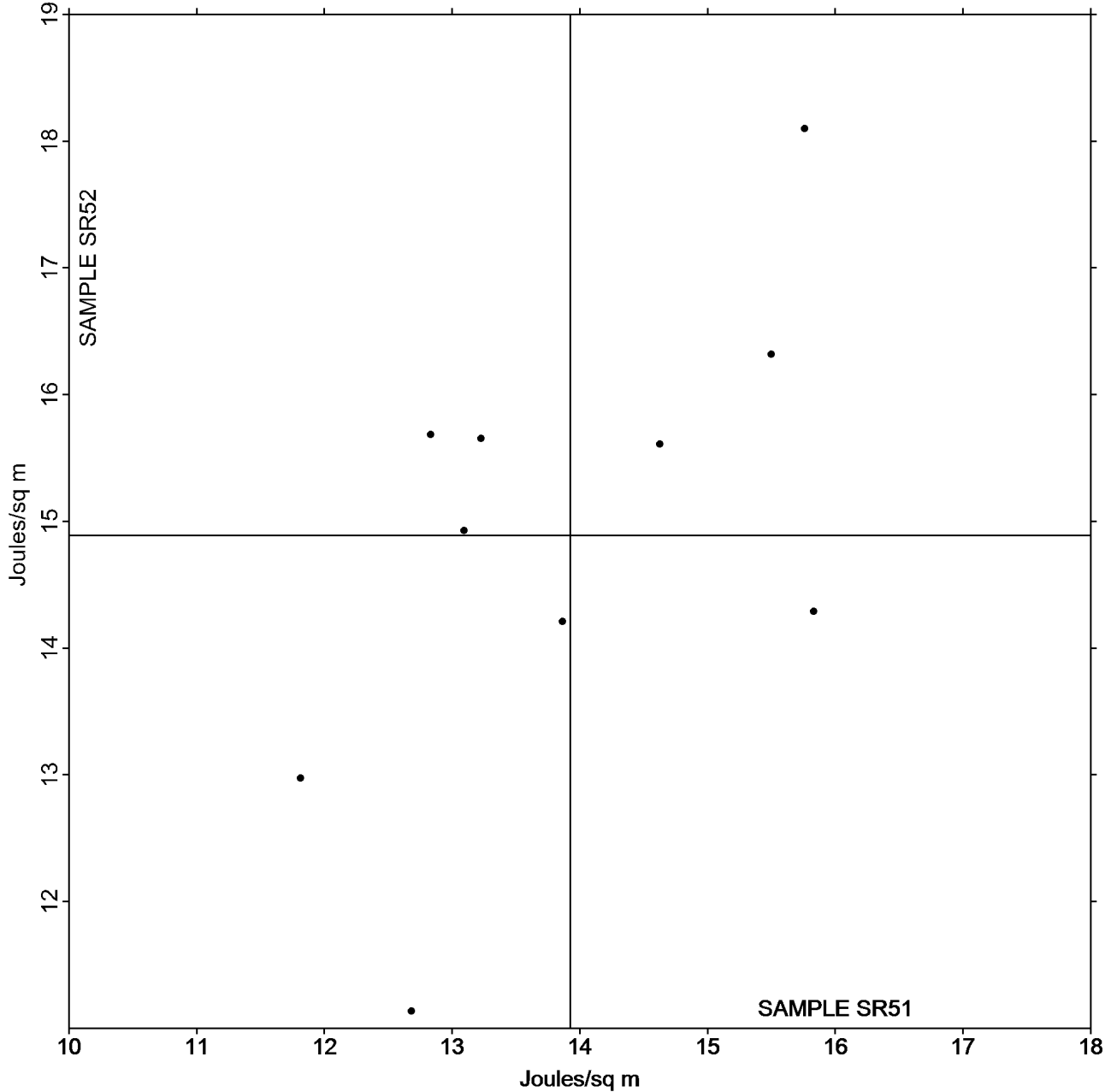**Paper & Paperboard Interlaboratory Testing Program**
**Analysis 321**
**Tensile Energy Absorption  - Newsprint**
**TAPPI Official Test Method T494**

**Report #2921S,
January 2018**

**Grand Mean Sample SR51 = 13.924
Joules/sq m**

**Grand Mean Sample SR52 = 14.890
Joules/sq m**



If fewer than 20 laboratories are included in an analysis, a control ellipse will not be drawn on the two-sample plot.

## Analysis 322
## Elongation to Break - Newsprint
### TAPPI Official Test Method T494

| WebCode | Data Flag | Sample SR51 | | | Sample SR52 | | |
|---|---|---|---|---|---|---|---|
| | | Lab Mean | Diff from Grand Mean | CPV | Lab Mean | Diff from Grand Mean | CPV |
| BJ6VQQ | | 1.385 | 0.272 | 2.35 | 1.269 | 0.139 | 2.08 |
| DEMKEY | | 1.049 | -0.064 | -0.55 | 1.113 | -0.017 | -0.25 |
| HHLG3F | | 1.043 | -0.070 | -0.61 | 1.077 | -0.052 | -0.78 |
| HP6KC3 | | 1.031 | -0.082 | -0.71 | 1.059 | -0.071 | -1.05 |
| KMUHEW | | 1.073 | -0.040 | -0.34 | 1.083 | -0.047 | -0.70 |
| MJLYER | | 1.069 | -0.044 | -0.38 | 1.157 | 0.027 | 0.41 |
| MTTLFF | | 1.133 | 0.020 | 0.17 | 1.159 | 0.029 | 0.44 |
| TCJUXH | X | 1.440 | 0.327 | 2.83 | 1.523 | 0.393 | 5.88 |
| UA7VXT | | 1.120 | 0.007 | 0.06 | 1.120 | -0.010 | -0.14 |

| Summary Statistics | Sample SR51 | Sample SR52 |
|---|---|---|
| **Grand Means** | 1.11 Percent | 1.13 Percent |
| **Stnd Dev Btwn Labs** | 0.12 Percent | 0.07 Percent |

Statistics based on 8 of 9 reporting participants.

### Comments on Assigned Data Flags for Test #322

TCJUXH (X) - Data for both samples are high.

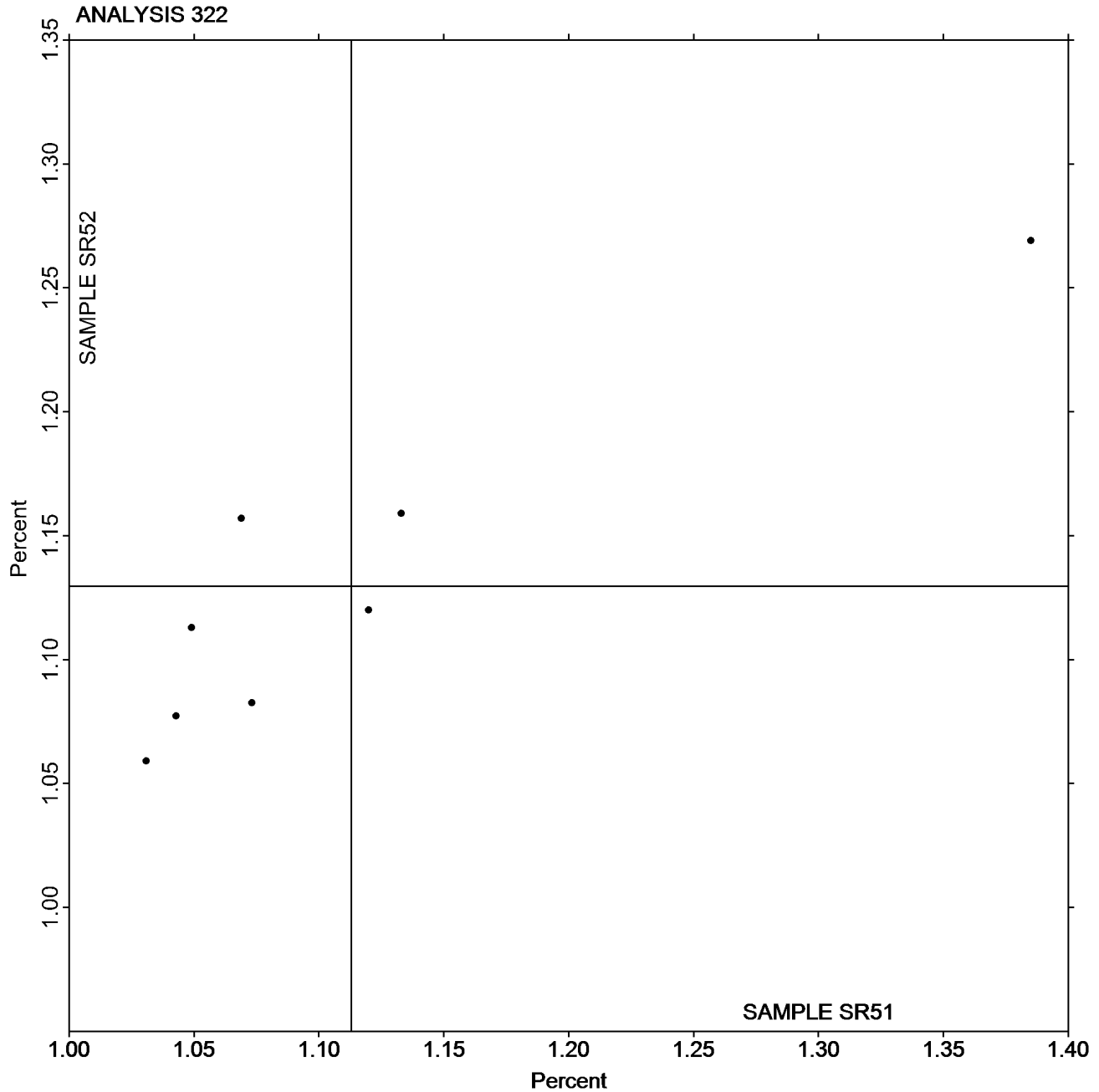**Paper & Paperboard Interlaboratory Testing Program**
**Analysis 322**
**Elongation to Break - Newsprint**
**TAPPI Official Test Method T494**

**Report #2921S,**
**January 2018**

**Grand Mean Sample SR51 = 1.1129 Percent**

**Grand Mean Sample SR52 = 1.1296 Percent**



If fewer than 20 laboratories are included in an analysis, a control ellipse will not be drawn on the two-sample plot.

# Paper & Paperboard Interlaboratory Testing Program

## Analysis 325
### Tensile Breaking Strength - Printing Papers
### TAPPI Official Test Method T494

| WebCode | Data Flag | Sample SF51 Lab Mean | Diff from Grand Mean | CPV | Sample SF52 Lab Mean | Diff from Grand Mean | CPV | Instr Code |
|---|---|---|---|---|---|---|---|---|
| 28ZK9H | * | 6.668 | -0.135 | -0.34 | 7.296 | 0.429 | 1.07 | TP |
| 2PK9FT | | 6.993 | 0.190 | 0.48 | 7.084 | 0.217 | 0.54 | TO |
| 33P3B2 | | 7.037 | 0.235 | 0.59 | 7.147 | 0.279 | 0.70 | LF |
| 3HYM2E | | 6.958 | 0.155 | 0.39 | 6.963 | 0.096 | 0.24 | LA |
| 4U9N6B | | 6.958 | 0.155 | 0.39 | 6.948 | 0.081 | 0.20 | LH |
| 62KB9C | | 6.640 | -0.162 | -0.41 | 6.702 | -0.165 | -0.41 | LH |
| 6ETWUP | | 6.715 | -0.088 | -0.22 | 6.666 | -0.202 | -0.50 | TB |
| 6YXGN6 | | 7.464 | 0.661 | 1.67 | 7.334 | 0.467 | 1.17 | XX |
| 82UZKM | | 6.493 | -0.310 | -0.78 | 6.607 | -0.260 | -0.65 | LH |
| 8N7VEC | | 6.466 | -0.337 | -0.85 | 6.910 | 0.043 | 0.11 | XX |
| 8V3RZT | | 7.170 | 0.367 | 0.93 | 7.296 | 0.429 | 1.07 | TJ |
| A4UP3M | | 6.832 | 0.030 | 0.08 | 6.841 | -0.026 | -0.07 | IM |
| BHRJNF | | 7.422 | 0.619 | 1.56 | 7.177 | 0.310 | 0.77 | LI |
| CJVHFZ | | 6.569 | -0.234 | -0.59 | 6.678 | -0.189 | -0.47 | LH |
| CKUJNC | | 6.222 | -0.580 | -1.46 | 6.450 | -0.417 | -1.04 | RE |
| CZN46Z | | 7.052 | 0.250 | 0.63 | 7.087 | 0.220 | 0.55 | TF |
| DEMKEY | | 6.548 | -0.255 | -0.64 | 6.698 | -0.169 | -0.42 | LH |
| GGGC7U | | 6.737 | -0.065 | -0.16 | 6.655 | -0.212 | -0.53 | IN |
| H6EEVZ | | 7.139 | 0.336 | 0.85 | 7.465 | 0.598 | 1.49 | TN |
| H6ZTFW | | 6.891 | 0.088 | 0.22 | 6.891 | 0.024 | 0.06 | TC |
| HJDHZQ | | 6.758 | -0.045 | -0.11 | 6.923 | 0.056 | 0.14 | LA |
| HU32MC | | 7.257 | 0.455 | 1.15 | 7.485 | 0.618 | 1.54 | LA |
| J8JEDC | | 7.679 | 0.877 | 2.21 | 7.674 | 0.807 | 2.01 | VM |
| JQWXAF | | 6.038 | -0.764 | -1.93 | 6.085 | -0.782 | -1.95 | CB |
| JQYQ73 | | 6.381 | -0.422 | -1.06 | 6.793 | -0.075 | -0.19 | TF |
| K8EGH7 | | 7.167 | 0.364 | 0.92 | 6.907 | 0.040 | 0.10 | LI |
| KPGAAZ | | 6.779 | -0.023 | -0.06 | 6.811 | -0.057 | -0.14 | TO |
| KPXA9V | | 6.564 | -0.239 | -0.60 | 6.551 | -0.316 | -0.79 | TB |
| M4AENM | | 6.802 | -0.001 | 0.00 | 6.555 | -0.312 | -0.78 | TP |
| MTUF3R | | 6.393 | -0.410 | -1.03 | 6.387 | -0.481 | -1.20 | LX |
| MU6BTP | X | 10.871 | 4.068 | 10.26 | 10.976 | 4.109 | 10.25 | LH |
| NT43RJ | | 6.566 | -0.237 | -0.60 | 6.379 | -0.488 | -1.22 | LI |
| NUYGMP | | 5.940 | -0.863 | -2.18 | 6.120 | -0.747 | -1.86 | ID |
| PDN7A3 | | 7.094 | 0.291 | 0.73 | 7.622 | 0.755 | 1.88 | LI |
| R69427 | | 7.100 | 0.297 | 0.75 | 7.147 | 0.280 | 0.70 | LI |
| V4ZK47 | | 5.850 | -0.953 | -2.40 | 6.015 | -0.852 | -2.13 | IM |
| VGNPC3 | | 7.137 | 0.334 | 0.84 | 6.980 | 0.113 | 0.28 | LX |
| VHNE4E | | 6.524 | -0.279 | -0.70 | 6.745 | -0.122 | -0.31 | TB |
| VUBX93 | | 7.051 | 0.248 | 0.63 | 7.327 | 0.459 | 1.15 | LH |
| WLZTZJ | | 6.748 | -0.054 | -0.14 | 6.804 | -0.063 | -0.16 | TO |

| WebCode | Data Flag | Sample SF51 Lab Mean | Diff from Grand Mean | CPV | Sample SF52 Lab Mean | Diff from Grand Mean | CPV | Instr Code |
|---|---|---|---|---|---|---|---|---|
| WWWW6D | | 6.695 | -0.108 | -0.27 | 6.660 | -0.207 | -0.52 | LI |
| XALXHY | | 7.362 | 0.560 | 1.41 | 7.401 | 0.534 | 1.33 | TJ |
| ZH834V | | 6.677 | -0.126 | -0.32 | 6.603 | -0.264 | -0.66 | LE |
| ZYTNLZ | * | 6.978 | 0.175 | 0.44 | 6.423 | -0.445 | -1.11 | XX |

| Summary Statistics | Sample SF51 | Sample SF52 |
|---|---|---|
| **Grand Means** | 6.80 kN/m | 6.87 kN/m |
| **Stnd Dev Btwn Labs** | 0.40 kN/m | 0.40 kN/m |

Statistics based on 43 of 44 reporting participants.

## Comments on Assigned Data Flags for Test #325

MU6BTP (X) - Extreme Data.

## Key to Instrument Codes Reported by Participants

| | | | |
|---|---|---|---|
| CB | Chatillon DFIS 50 (Digital Gauge)/TCD 200 | ID | Instron 4201/4202 |
| IM | Instron 5500 Series | IN | Instron 3340 series |
| LA | L & W Tensile - Autoline 300 | LE | L & W Tensile Tester 066 |
| LF | L & W Tensile/Fracture Toughness Tester SE 064 | LH | L & W Alwetron TH1 (Horizontal) SE 060/065F |
| LI | L & W Tensile Tester SE 062 | LX | L & W (model not specified) |
| RE | Regmed | TB | Thwing-Albert EJA/1000 |
| TC | Thwing-Albert Electro-Hydraulic, Model 30LT | TF | Thwing-Albert EJA Vantage-1 |
| TJ | Thwing-Albert QC II-XS | TN | Testometric M100-1CT |
| TO | Thwing-Albert QC-1000 | TP | TMI Monitor/Tensile 100 (84-21-01) |
| VM | Valmet PaperLab (was Kajaani/Robotest) | XX | Instrument make/model not specified by lab |

**Paper & Paperboard Interlaboratory Testing Program**
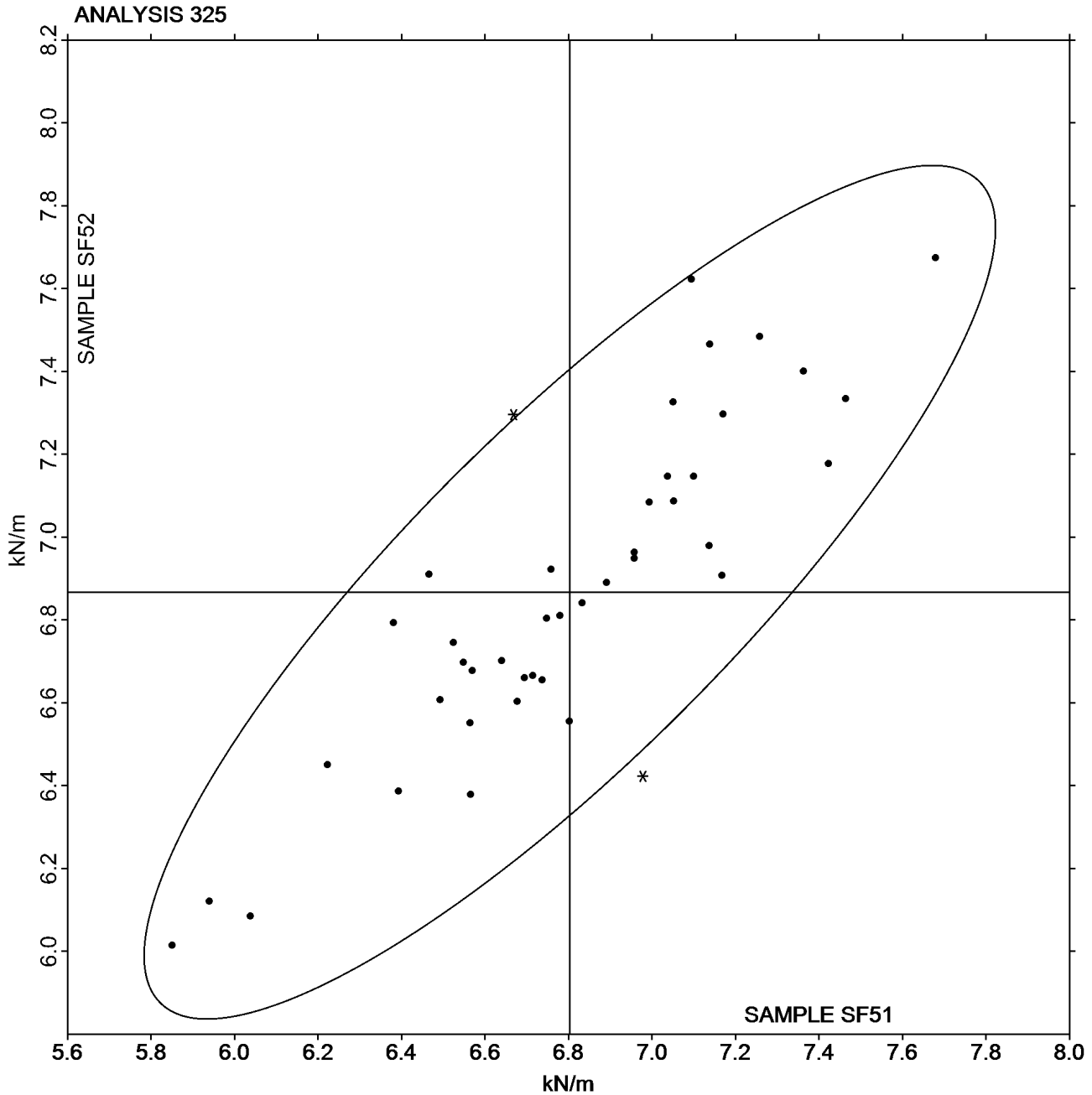**Analysis 325**
**Tensile Breaking Strength - Printing Papers**
**TAPPI Official Test Method T494**

**Report #2921S,**
**January 2018**

**Grand Mean Sample SF51 = 6.8027 kN/m**

**Grand Mean Sample SF52 = 6.8672 kN/m**

# Paper & Paperboard Interlaboratory Testing Program
## Analysis 327
### Tensile Energy Absorption - Printing Papers
### TAPPI Official Test Method T494

| WebCode | Data Flag | Sample SF51 Lab Mean | Sample SF51 Diff from Grand Mean | Sample SF51 CPV | Sample SF52 Lab Mean | Sample SF52 Diff from Grand Mean | Sample SF52 CPV | Instr Code |
|---------|-----------|----------|-----------------------|------|----------|-----------------------|------|------------|
| 2PK9FT  |     | 90.11  | -4.26   | -0.54 | 92.21  | -3.14   | -0.40 | TO |
| 33P3B2  | *   | 70.14  | -24.23  | -3.09 | 73.17  | -22.18  | -2.82 | LW |
| 3HYM2E  |     | 100.73 | 6.36    | 0.81  | 99.30  | 3.95    | 0.50  | LA |
| 4U9N6B  |     | 97.28  | 2.91    | 0.37  | 92.45  | -2.91   | -0.37 | LH |
| 62KB9C  |     | 94.66  | 0.29    | 0.04  | 97.02  | 1.67    | 0.21  | LH |
| 6ETWUP  |     | 91.82  | -2.55   | -0.32 | 88.02  | -7.34   | -0.93 | TB |
| 82UZKM  |     | 84.85  | -9.52   | -1.21 | 88.38  | -6.97   | -0.89 | LH |
| 8V3RZT  | X   | 57.98  | -36.39  | -4.64 | 62.61  | -32.75  | -4.16 | TJ |
| A4UP3M  |     | 101.24 | 6.87    | 0.88  | 100.04 | 4.69    | 0.60  | IM |
| BHRJNF  |     | 110.32 | 15.95   | 2.03  | 99.25  | 3.89    | 0.49  | LI |
| CKUJNC  |     | 87.89  | -6.48   | -0.83 | 96.05  | 0.70    | 0.09  | RE |
| CZN46Z  |     | 93.27  | -1.10   | -0.14 | 87.99  | -7.37   | -0.94 | TF |
| DEMKEY  |     | 86.75  | -7.62   | -0.97 | 91.57  | -3.79   | -0.48 | LH |
| H6EEVZ  |     | 97.20  | 2.83    | 0.36  | 94.35  | -1.00   | -0.13 | LX |
| HU32MC  |     | 101.26 | 6.89    | 0.88  | 102.78 | 7.43    | 0.94  | LA |
| K8EGH7  |     | 101.29 | 6.92    | 0.88  | 97.46  | 2.11    | 0.27  | LI |
| KPGAAZ  |     | 98.51  | 4.14    | 0.53  | 99.97  | 4.61    | 0.59  | TO |
| MTUF3R  |     | 87.39  | -6.98   | -0.89 | 87.74  | -7.62   | -0.97 | LX |
| MU6BTP  | X   | 153.50 | 59.13   | 7.54  | 153.27 | 57.92   | 7.36  | LH |
| NT43RJ  |     | 88.82  | -5.55   | -0.71 | 83.41  | -11.95  | -1.52 | LI |
| NUYGMP  | X   | 56.72  | -37.65  | -4.80 | 57.93  | -37.42  | -4.76 | ID |
| PDN7A3  |     | 96.19  | 1.81    | 0.23  | 106.56 | 11.20   | 1.42  | LI |
| R69427  |     | 89.46  | -4.91   | -0.63 | 90.39  | -4.96   | -0.63 | LI |
| V4ZK47  |     | 94.53  | 0.15    | 0.02  | 107.72 | 12.36   | 1.57  | IM |
| VGNPC3  |     | 99.77  | 5.40    | 0.69  | 97.84  | 2.48    | 0.32  | LX |
| VHNE4E  |     | 95.95  | 1.58    | 0.20  | 105.50 | 10.14   | 1.29  | TB |
| VUBX93  |     | 97.13  | 2.76    | 0.35  | 103.47 | 8.11    | 1.03  | LH |
| WWWW6D  |     | 92.15  | -2.22   | -0.28 | 94.23  | -1.12   | -0.14 | LI |
| ZYTNLZ  |     | 104.95 | 10.57   | 1.35  | 102.36 | 7.01    | 0.89  | XX |

| Summary Statistics | Sample SF51 | Sample SF52 |
|---|---|---|
| Grand Means | 94.37 Joules/sq m | 95.35 Joules/sq m |
| Stnd Dev Btwn Labs | 7.84 Joules/sq m | 7.87 Joules/sq m |

Statistics based on 26 of 29 reporting participants.

## Comments on Assigned Data Flags for Test #327

NUYGMP (X) - Data for both samples are low. Possible Systematic Error.

MU6BTP (X) - Extreme Data.

8V3RZT (X) - Data for both samples are low. Possible Systematic Error.

**Paper & Paperboard Interlaboratory Testing Program**
**Analysis 327**
**Tensile Energy Absorption - Printing Papers**
**TAPPI Official Test Method T494**

**Report #2921S,**
**January 2018**

### Analysis Notes:

6ETWUP -  Data appear to be reported as kg-m/sq m, not J/sq m as indicated on datasheet. Units corrected by CTS.

| Key to Instrument Codes Reported by Participants | | | |
| --- | --- | --- | --- |
| ID | Instron 4201 | IM | Instron 5500 Series |
| LA | L & W Tensile - Autoline 300 | LH | L & W Alwetron TH1 (Horizontal) SE 060 |
| LI | L & W Tensile Tester SE 062 | LW | L & W Tensile Tester SE 064 |
| LX | L & W (model not specified) | RE | Regmed |
| TB | Thwing-Albert EJA/1000 | TF | Thwing-Albert EJA Vantage-1 |
| TJ | Thwing-Albert QC II-XS | TO | Thwing-Albert QC-1000 |
| XX | Instrument make/model not specified by lab | | |

**Paper & Paperboard Interlaboratory Testing Program**
**Analysis 327**
**Tensile Energy Absorption - Printing Papers**
**TAPPI Official Test Method T494**

**Report #2921S,**
**January 2018**

**Grand Mean Sample SF51 = 94.371**
**Joules/sq m**

**Grand Mean Sample SF52 = 95.354**
**Joules/sq m**
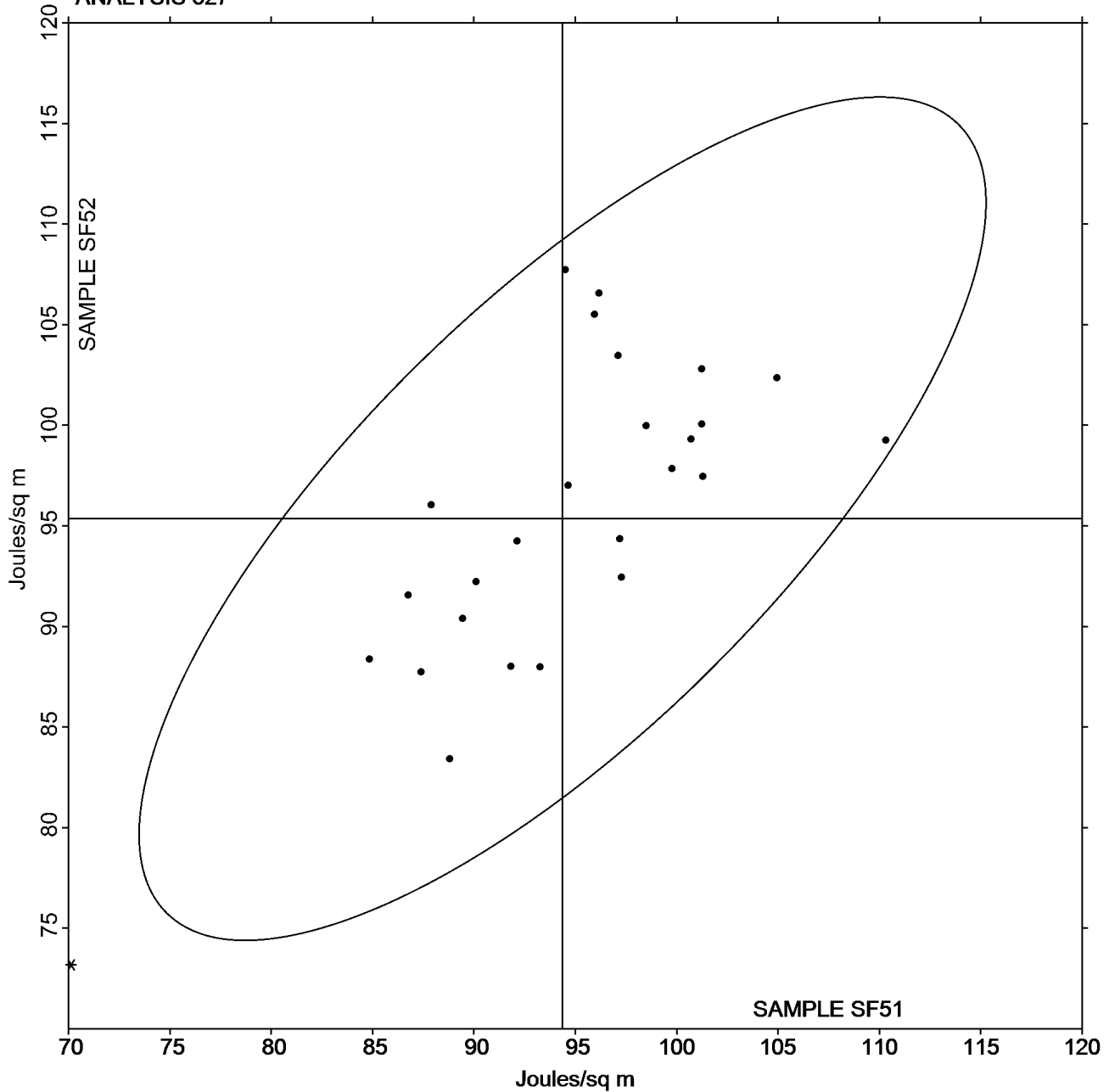
# Paper & Paperboard Interlaboratory Testing Program

## Analysis 328
## Elongation to Break - Printing Papers
### TAPPI Official Test Method T494

| WebCode | Data Flag | Sample SF51 Lab Mean | Sample SF51 Diff from Grand Mean | Sample SF51 CPV | Sample SF52 Lab Mean | Sample SF52 Diff from Grand Mean | Sample SF52 CPV | Instr Code |
|---|---|---|---|---|---|---|---|---|
| 2PK9FT |   | 1.960 | -0.165 | -0.83 | 1.979 | -0.153 | -0.71 | TG |
| 33P3B2 | * | 1.601 | -0.524 | -2.64 | 1.629 | -0.503 | -2.32 | LX |
| 3HYM2E |   | 1.975 | -0.150 | -0.75 | 1.974 | -0.158 | -0.73 | XX |
| 4U9N6B |   | 2.124 | -0.001 | 0.00 | 2.023 | -0.109 | -0.50 | LH |
| 62KB9C |   | 2.161 | 0.036 | 0.18 | 2.190 | 0.058 | 0.27 | LH |
| 6ETWUP |   | 2.109 | -0.016 | -0.08 | 2.037 | -0.095 | -0.44 | TB |
| 82UZKM |   | 2.001 | -0.124 | -0.62 | 2.041 | -0.091 | -0.42 | LH |
| 8V3RZT | X | 1.250 | -0.875 | -4.41 | 1.341 | -0.791 | -3.65 | TJ |
| A4UP3M |   | 2.266 | 0.142 | 0.72 | 2.288 | 0.156 | 0.72 | IM |
| BHRJNF |   | 2.277 | 0.152 | 0.77 | 2.113 | -0.019 | -0.09 | LI |
| CKUJNC |   | 2.320 | 0.196 | 0.99 | 2.358 | 0.226 | 1.05 | RE |
| CZN46Z |   | 2.165 | 0.040 | 0.20 | 2.049 | -0.083 | -0.38 | TF |
| DEMKEY |   | 2.016 | -0.109 | -0.55 | 2.081 | -0.051 | -0.23 | LH |
| GGGC7U |   | 2.292 | 0.167 | 0.84 | 2.297 | 0.165 | 0.76 | IN |
| H6EEVZ | * | 2.365 | 0.240 | 1.21 | 2.133 | 0.001 | 0.01 | LX |
| HU32MC |   | 1.943 | -0.182 | -0.92 | 1.908 | -0.224 | -1.03 | LA |
| J8JEDC |   | 1.690 | -0.435 | -2.19 | 1.678 | -0.454 | -2.10 | VM |
| JQYQ73 |   | 2.260 | 0.135 | 0.68 | 2.360 | 0.228 | 1.05 | TF |
| K8EGH7 |   | 2.149 | 0.024 | 0.12 | 2.137 | 0.005 | 0.02 | LI |
| KPGAAZ |   | 2.107 | -0.018 | -0.09 | 2.111 | -0.021 | -0.10 | TO |
| KPXA9V |   | 2.040 | -0.085 | -0.43 | 2.130 | -0.002 | -0.01 | TF |
| MTUF3R |   | 2.086 | -0.039 | -0.19 | 2.093 | -0.039 | -0.18 | LX |
| MU6BTP |   | 2.192 | 0.067 | 0.34 | 2.175 | 0.043 | 0.20 | LH |
| NT43RJ |   | 2.055 | -0.070 | -0.35 | 1.989 | -0.143 | -0.66 | LI |
| NUYGMP |   | 2.527 | 0.402 | 2.03 | 2.510 | 0.379 | 1.75 | ID |
| PDN7A3 |   | 1.912 | -0.213 | -1.07 | 1.972 | -0.160 | -0.74 | LI |
| R69427 |   | 1.956 | -0.169 | -0.85 | 1.968 | -0.164 | -0.76 | LI |
| V4ZK47 | * | 2.506 | 0.382 | 1.92 | 2.680 | 0.548 | 2.53 | XX |
| VGNPC3 |   | 2.145 | 0.020 | 0.10 | 2.149 | 0.017 | 0.08 | LX |
| VHNE4E |   | 2.298 | 0.173 | 0.87 | 2.439 | 0.307 | 1.42 | TB |
| VUBX93 |   | 2.107 | -0.018 | -0.09 | 2.150 | 0.018 | 0.08 | LH |
| WWWW6D |   | 2.099 | -0.026 | -0.13 | 2.161 | 0.029 | 0.13 | LI |
| ZYTNLZ |   | 2.284 | 0.159 | 0.80 | 2.417 | 0.285 | 1.32 | XX |

| Summary Statistics | Sample SF51 | Sample SF52 |
|---|---|---|
| Grand Means | 2.12 Percent | 2.13 Percent |
| Stnd Dev Btwn Labs | 0.20 Percent | 0.22 Percent |

Statistics based on 32 of 33 reporting participants.

**Paper & Paperboard Interlaboratory Testing Program**
**Analysis 328**
**Elongation to Break - Printing Papers**
**TAPPI Official Test Method T494**

**Report #2921S,**
**January 2018**

## Comments on Assigned Data Flags for Test #328

8V3RZT (X) -  Data for both samples are low. Possible Systematic Error.

| Key to Instrument Codes Reported by Participants | | | |
|---|---|---|---|
| ID | Instron 4201 | IM | Instron 5500 |
| IN | Instron 3340 Series | LA | L & W Tensile - Autoline 300 |
| LH | L & W Alwetron TH1 (Horizontal) SE 060 | LI | L & W Tensile Tester SE 062 |
| LX | L & W (model not specified) | RE | Regmed |
| TB | Thwing-Albert EJA/1000 | TF | Thwing-Albert EJA Vantage-1 |
| TG | Thwing-Albert QC | TJ | Thwing-Albert QC II-XS |
| TO | Thwing-Albert QC-1000 | VM | Valmet PaperLab (was Kajaani/Robotest) |
| XX | Instrument make/model not specified by lab | | |

**Paper & Paperboard Interlaboratory Testing Program**
**Analysis 328**
**Elongation to Break - Printing Papers**
**TAPPI Official Test Method T494**

**Report #2921S, January 2018**

**Grand Mean Sample SF51 = 2.1246 Percent**

**Grand Mean Sample SF52 = 2.1319 Percent**
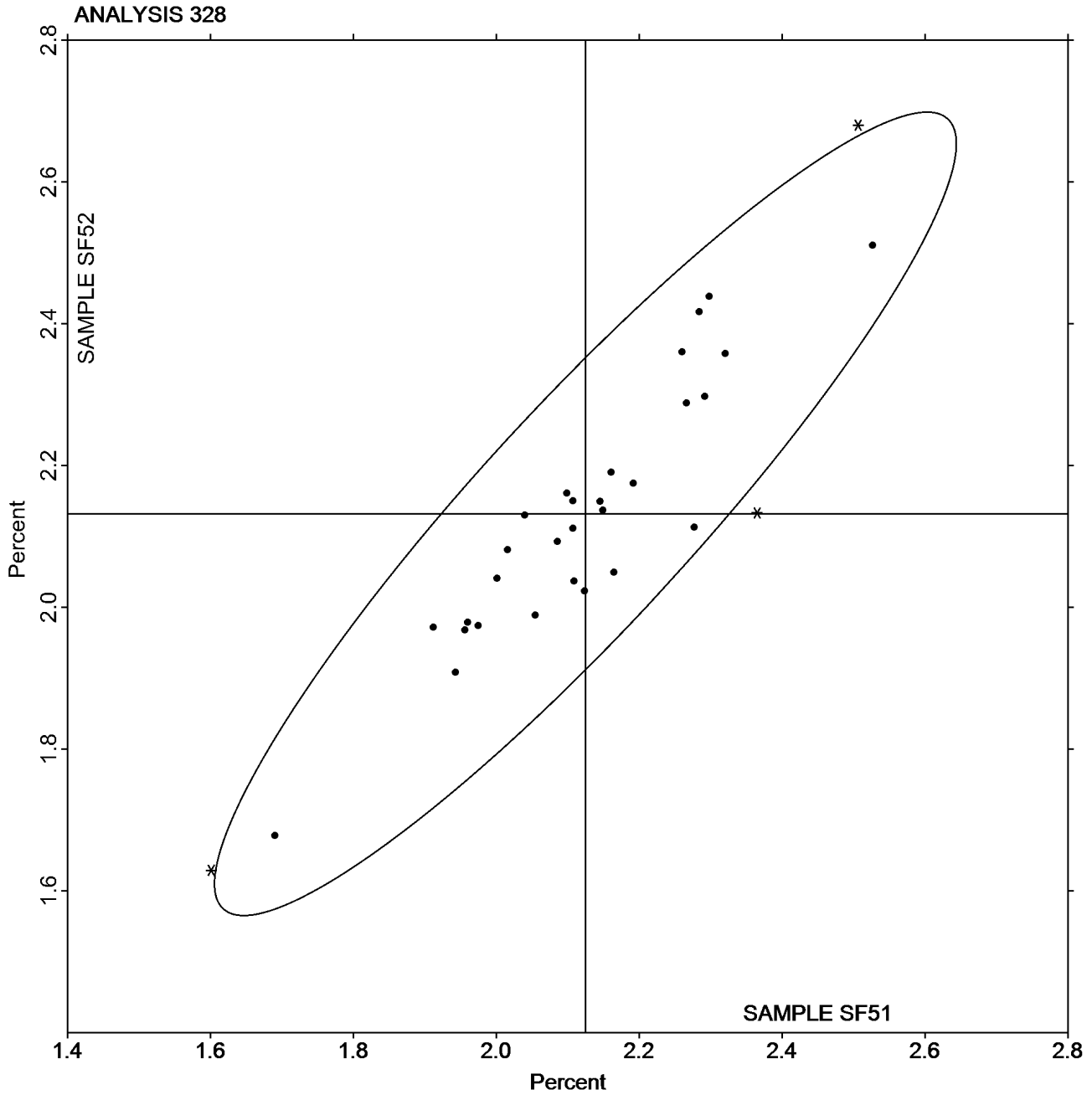


ANALYSIS 328

SAMPLE SF52

SAMPLE SF51

Percent

Percent

# Paper & Paperboard Interlaboratory Testing Program
## Analysis 330
### Tensile Breaking Strength -  Packaging Papers
#### TAPPI Official Test Method T494

| WebCode | Data Flag | Sample SE51 | | | Sample SE52 | | | Instr Code |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | Lab Mean | Diff from Grand Mean | CPV | Lab Mean | Diff from Grand Mean | CPV | |
| 2RN8QK | | 9.404 | 0.080 | 0.11 | 9.667 | 0.320 | 0.47 | TO |
| 3C7H9A | | 9.201 | -0.123 | -0.18 | 9.178 | -0.170 | -0.25 | TB |
| 3DYPBL | X | 8.534 | -0.791 | -1.13 | 7.592 | -1.755 | -2.56 | IF |
| 62KB9C | | 9.020 | -0.304 | -0.44 | 8.921 | -0.426 | -0.62 | LH |
| 6ETWUP | | 8.918 | -0.406 | -0.58 | 8.903 | -0.444 | -0.65 | TB |
| 7AWF63 | | 9.736 | 0.411 | 0.59 | 9.621 | 0.274 | 0.40 | TO |
| 7DUY82 | | 8.417 | -0.908 | -1.30 | 8.259 | -1.088 | -1.59 | TK |
| 7LMJ32 | | 10.052 | 0.728 | 1.04 | 10.140 | 0.793 | 1.16 | TH |
| 8E4NLX | | 8.474 | -0.850 | -1.22 | 9.070 | -0.277 | -0.40 | LE |
| 8PL4J7 | | 10.552 | 1.227 | 1.76 | 10.526 | 1.179 | 1.72 | IK |
| A728ZH | | 9.456 | 0.131 | 0.19 | 9.657 | 0.310 | 0.45 | LW |
| AYH22P | | 8.546 | -0.778 | -1.12 | 8.774 | -0.573 | -0.84 | IF |
| BRBV2D | | 9.765 | 0.441 | 0.63 | 9.600 | 0.253 | 0.37 | ID |
| BX26DW | | 9.694 | 0.370 | 0.53 | 9.975 | 0.628 | 0.92 | TR |
| C22NZV | | 8.453 | -0.871 | -1.25 | 8.480 | -0.867 | -1.26 | XX |
| CA9CPM | | 8.962 | -0.362 | -0.52 | 8.925 | -0.422 | -0.62 | IK |
| CZN46Z | | 9.396 | 0.071 | 0.10 | 9.280 | -0.067 | -0.10 | TO |
| DMD4UT | | 8.681 | -0.643 | -0.92 | 8.824 | -0.523 | -0.76 | XX |
| E4GX2R | | 9.127 | -0.198 | -0.28 | 9.310 | -0.037 | -0.05 | LH |
| E6RQTL | | 9.721 | 0.397 | 0.57 | 9.939 | 0.592 | 0.86 | LE |
| EHXV7T | | 8.933 | -0.391 | -0.56 | 8.940 | -0.407 | -0.59 | IM |
| FC2KF2 | | 9.650 | 0.326 | 0.47 | 10.063 | 0.716 | 1.04 | TA |
| G8BKMR | | 10.540 | 1.216 | 1.74 | 10.648 | 1.301 | 1.90 | LA |
| GAVELD | | 8.662 | -0.663 | -0.95 | 8.605 | -0.742 | -1.08 | TA |
| GXK27X | | 8.958 | -0.366 | -0.53 | 9.109 | -0.238 | -0.35 | TP |
| J2VWYZ | | 9.551 | 0.227 | 0.33 | 9.526 | 0.179 | 0.26 | LX |
| J3A8UY | | 11.044 | 1.719 | 2.46 | 10.947 | 1.600 | 2.33 | LA |
| J4HFWR | | 8.369 | -0.955 | -1.37 | 8.488 | -0.859 | -1.25 | IP |
| JAQMTN | | 9.142 | -0.183 | -0.26 | 8.747 | -0.600 | -0.87 | IM |
| L68JNP | | 8.961 | -0.363 | -0.52 | 8.858 | -0.489 | -0.71 | TH |
| LU2H6Q | X | 8.063 | -1.262 | -1.81 | 7.401 | -1.946 | -2.84 | IN |
| MVZ4FW | * | 8.237 | -1.088 | -1.56 | 8.825 | -0.522 | -0.76 | ID |
| NGTGJK | | 10.635 | 1.310 | 1.88 | 10.645 | 1.298 | 1.89 | TH |
| PVLNYX | * | 10.841 | 1.516 | 2.17 | 10.362 | 1.015 | 1.48 | LI |
| Q6ATTH | | 9.275 | -0.049 | -0.07 | 9.295 | -0.052 | -0.08 | TR |
| QAKT23 | | 8.726 | -0.598 | -0.86 | 8.590 | -0.757 | -1.10 | LE |
| QEWXEN | | 9.245 | -0.079 | -0.11 | 9.148 | -0.199 | -0.29 | TT |
| T23C8J | | 9.124 | -0.200 | -0.29 | 9.019 | -0.328 | -0.48 | LE |
| TCGDJJ | | 10.282 | 0.957 | 1.37 | 10.041 | 0.694 | 1.01 | TX |
| TCZ23Y | | 9.485 | 0.161 | 0.23 | 9.488 | 0.141 | 0.21 | LH |

# Paper & Paperboard Interlaboratory Testing Program
## Analysis 330
## Tensile Breaking Strength -  Packaging Papers
## TAPPI Official Test Method T494

**Report #2921S, January 2018**

|  |  | Sample SE51 | | | Sample SE52 | | | |
|---|---|---|---|---|---|---|---|---|
| WebCode | Data Flag | Lab Mean | Diff from Grand Mean | CPV | Lab Mean | Diff from Grand Mean | CPV | Instr Code |
| UYGR3F |  | 9.383 | 0.059 | 0.08 | 9.183 | -0.164 | -0.24 | LW |
| VEFB6W |  | 8.796 | -0.528 | -0.76 | 8.415 | -0.932 | -1.36 | LA |
| WNZ26T | X | 0.152 | -9.173 | -13.15 | 0.170 | -9.177 | -13.38 | DW |
| XLVLJ9 |  | 8.583 | -0.742 | -1.06 | 8.333 | -1.014 | -1.48 | LE |
| XX3QDH |  | 9.233 | -0.092 | -0.13 | 9.832 | 0.485 | 0.71 | XX |
| YH8MAJ |  | 9.721 | 0.397 | 0.57 | 9.767 | 0.420 | 0.61 | TH |

| Summary Statistics | Sample SE51 | Sample SE52 |
|---|---|---|
| **Grand Means** | 9.32 kN/m | 9.35 kN/m |
| **Stnd Dev Btwn Labs** | 0.70 kN/m | 0.69 kN/m |

Statistics based on 43 of  46 reporting participants.

## Comments on Assigned Data Flags for Test #330

WNZ26T (X) -  Extreme Data.

3DYPBL (X) -  Inconsistent in testing between samples.

LU2H6Q (X) -  Data for sample SE52 are low. Inconsistent within the determinations of both samples.

## Key to Instrument Codes Reported by Participants

| | | | |
|---|---|---|---|
| DW | Dongguan Walter W-304 Tester | ID | Instron 4201 |
| IF | Instron 3340 Series | IK | Instron 4400 Series |
| IM | Instron 5500 Series | IN | Instron 3360 Series |
| IP | Instron 4206 | LA | L & W Autoline |
| LE | L & W Tensile Tester 066 | LH | L & W Alwetron TH1 (Horizontal) SE 060 |
| LI | LLoyds Instruments | LW | L & W Tensile Tester SE062 |
| LX | L & W (model not specified) | TA | Thwing-Albert Tensile Tester |
| TB | Thwing-Albert EJA/1000 | TH | Thwing-Albert QC-3A |
| TK | Thwing-Albert Model 37-4 | TO | Thwing-Albert QC-1000 |
| TP | TMI Monitor/Tensile 100 (84-21-01) | TR | TMI Horizontal Tensile Tester |
| TT | Tinius Olsen Model MHT | TX | Thwing-Albert (model not specified) |
| XX | Instrument make/model not specified by lab | | |

# Paper & Paperboard Interlaboratory Testing Program
## Analysis 330
### Tensile Breaking Strength - Packaging Papers
#### TAPPI Official Test Method T494

**Report #2921S, January 2018**

**Grand Mean Sample SE51 = 9.3245 kN/m**

**Grand Mean Sample SE52 = 9.3470 kN/m**
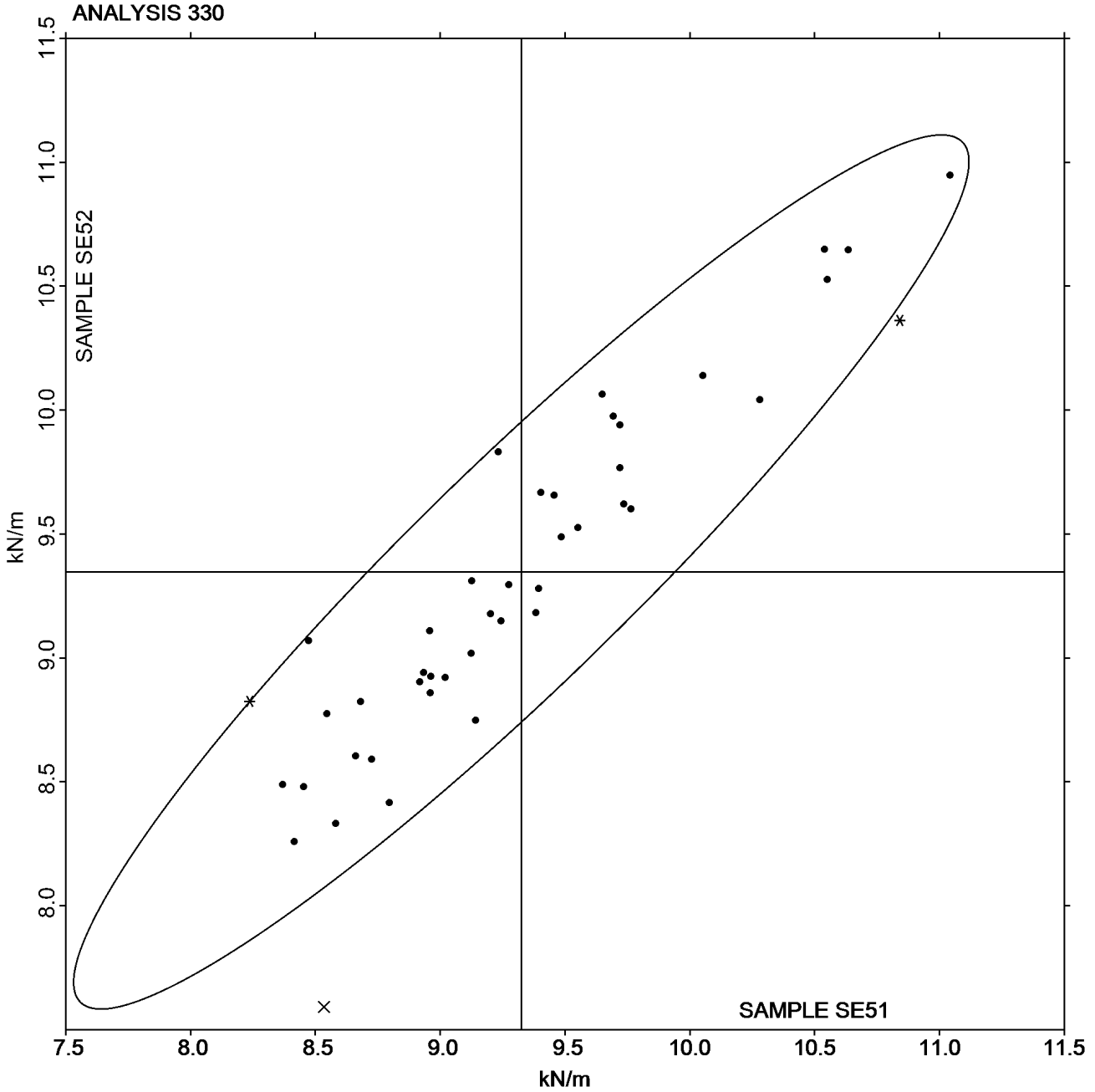
# Paper & Paperboard Interlaboratory Testing Program
## Analysis 331
### Tensile Energy Absorption -  Packaging Papers
### TAPPI Official Test Method T494

**Report #2921S,
January 2018**

|  |  | Sample SE51 | | | Sample SE52 | | |  |
|---|---|---|---|---|---|---|---|---|
| WebCode | Data Flag | Lab Mean | Diff from Grand Mean | CPV | Lab Mean | Diff from Grand Mean | CPV | Instr Code |
| 2RN8QK |   | 114.1 | 5.3 | 0.45 | 118.8 | 9.9 | 0.74 | TO |
| 3C7H9A |   | 117.9 | 9.0 | 0.78 | 118.1 | 9.1 | 0.68 | TB |
| 62KB9C |   | 102.5 | -6.3 | -0.54 | 101.3 | -7.6 | -0.57 | LH |
| 6ETWUP |   | 102.2 | -6.7 | -0.57 | 97.3 | -11.7 | -0.87 | TB |
| 7AWF63 |   | 115.9 | 7.1 | 0.61 | 111.4 | 2.5 | 0.18 | TO |
| 7DUY82 |   | 98.8 | -10.1 | -0.87 | 96.0 | -12.9 | -0.97 | TK |
| 8E4NLX |   | 95.3 | -13.5 | -1.16 | 112.5 | 3.6 | 0.27 | LE |
| 8PL4J7 |   | 97.6 | -11.3 | -0.97 | 94.5 | -14.4 | -1.08 | XX |
| A728ZH |   | 96.4 | -12.4 | -1.06 | 98.8 | -10.1 | -0.76 | LW |
| AYH22P |   | 99.9 | -8.9 | -0.77 | 115.1 | 6.2 | 0.46 | IF |
| BX26DW |   | 110.4 | 1.5 | 0.13 | 113.2 | 4.3 | 0.32 | TR |
| C22NZV |   | 103.3 | -5.6 | -0.48 | 104.7 | -4.2 | -0.32 | XX |
| CA9CPM |   | 127.3 | 18.4 | 1.58 | 126.6 | 17.7 | 1.32 | IK |
| CZN46Z |   | 110.9 | 2.1 | 0.18 | 114.7 | 5.8 | 0.43 | TO |
| DMD4UT |   | 97.6 | -11.2 | -0.96 | 99.9 | -9.0 | -0.68 | XX |
| E4GX2R |   | 106.5 | -2.3 | -0.20 | 109.8 | 0.9 | 0.06 | LH |
| E6RQTL |   | 115.4 | 6.6 | 0.56 | 124.8 | 15.9 | 1.19 | LE |
| EHXV7T |   | 108.7 | -0.1 | -0.01 | 112.1 | 3.2 | 0.24 | IM |
| FC2KF2 |   | 95.9 | -12.9 | -1.11 | 106.8 | -2.1 | -0.16 | TA |
| G8BKMR |   | 119.3 | 10.4 | 0.89 | 123.1 | 14.2 | 1.06 | LA |
| GXK27X |   | 120.6 | 11.7 | 1.01 | 130.3 | 21.4 | 1.60 | TP |
| J3A8UY |   | 117.0 | 8.2 | 0.70 | 120.9 | 11.9 | 0.89 | LA |
| J4HFWR |   | 94.9 | -13.9 | -1.20 | 93.2 | -15.8 | -1.18 | IP |
| JAQMTN |   | 113.2 | 4.4 | 0.38 | 101.2 | -7.8 | -0.58 | IM |
| L68JNP |   | 114.7 | 5.8 | 0.50 | 117.9 | 9.0 | 0.67 | TH |
| LU2H6Q | * | 109.1 | 0.3 | 0.02 | 86.3 | -22.6 | -1.69 | IN |
| MVZ4FW |   | 95.1 | -13.7 | -1.18 | 99.9 | -9.1 | -0.68 | ID |
| NGTGJK |   | 109.7 | 0.9 | 0.08 | 109.6 | 0.7 | 0.05 | TH |
| Q6ATTH | X | 1.8 | -107.0 | -9.19 | 1.8 | -107.1 | -8.00 | TR |
| QAKT23 |   | 98.6 | -10.2 | -0.88 | 92.5 | -16.4 | -1.23 | LE |
| QEWXEN |   | 106.8 | -2.0 | -0.17 | 104.3 | -4.6 | -0.34 | TT |
| T23C8J |   | 99.3 | -9.6 | -0.82 | 96.1 | -12.8 | -0.96 | LE |
| TCGDJJ |   | 132.8 | 23.9 | 2.05 | 124.3 | 15.3 | 1.15 | XX |
| TCZ23Y |   | 90.5 | -18.4 | -1.58 | 89.5 | -19.4 | -1.45 | LH |
| UYGR3F |   | 105.3 | -3.6 | -0.31 | 95.5 | -13.5 | -1.01 | LW |
| VEFB6W |   | 121.5 | 12.7 | 1.09 | 110.0 | 1.0 | 0.08 | LA |
| WNZ26T | X | 67.9 | -40.9 | -3.51 | 84.9 | -24.0 | -1.80 | DW |
| XLVLJ9 |   | 102.0 | -6.8 | -0.59 | 95.4 | -13.5 | -1.01 | LE |
| XX3QDH | * | 137.2 | 28.3 | 2.43 | 147.7 | 38.8 | 2.90 | XX |
| YH8MAJ |   | 131.8 | 23.0 | 1.97 | 125.2 | 16.3 | 1.22 | TH |

**Paper & Paperboard Interlaboratory Testing Program**
**Analysis 331**
**Tensile Energy Absorption -  Packaging Papers**
**TAPPI Official Test Method T494**

**Report #2921S,**
**January 2018**

| Summary Statistics | Sample SE51 | Sample SE52 |
|---|---|---|
| **Grand Means** | 108.84 Joules/sq m | 108.93 Joules/sq m |
| **Stnd Dev Btwn Labs** | 11.65 Joules/sq m | 13.38 Joules/sq m |

Statistics based on 38 of  40 reporting participants.

## Comments on Assigned Data Flags for Test #331

Q6ATTH (X) -  Extreme Data.

WNZ26T (X) -  Data for sample SE51 are low.

## Analysis Notes:

6ETWUP -   Data appear to be reported as kg-m/sq m, not J/sq m as indicated on datasheet. Units corrected by CTS.

8E4NLX -   One determination removed from the Lab Mean of Sample SE51 per Grubb's Test at 1% risk (TAPPI 1205).

Q6ATTH -   Data appears to be transposed between Analysis 331 (TEA) and Analysis 332 (% elongation).

TCGDJJ -   Data appear to be reported as ft-lb/sq ft, not inch-lb/sq inch as indicated on datasheet. Units corrected by CTS.

## Key to Instrument Codes Reported by Participants

| Code | Instrument | Code | Instrument |
|---|---|---|---|
| DW | Dongguan Walter W-304 Tester | ID | Instron 4201 |
| IF | Instron 3340 Series | IK | Instron 4400 Series |
| IM | Instron 5500 Series | IN | Instron 3360 Series |
| IP | Instron 4206 | LA | L & W Autoline |
| LE | L & W Tensile Tester 066 | LH | L & W Alwetron TH1 (Horizontal) SE 060 |
| LW | L & W Tensile Tester SE062 | TA | Thwing-Albert Tensile Tester |
| TB | Thwing-Albert EJA/1000 | TH | Thwing-Albert QC-3A |
| TK | Thwing-Albert Model 37-4 | TO | Thwing-Albert QC-1000 |
| TP | TMI Monitor/Tensile 100 (84-21-01) | TR | TMI Horizontal Tensile Tester |
| TT | Tinius Olsen Model MHT | XX | Instrument make/model not specified by lab |

# Paper & Paperboard Interlaboratory Testing Program
## Analysis 331
## Tensile Energy Absorption -  Packaging Papers
## TAPPI Official Test Method T494

**Report #2921S,
January 2018**

**Grand Mean Sample SE51 = 108.84
Joules/sq m**

**Grand Mean Sample SE52 = 108.93
Joules/sq m**



ANALYSIS 331
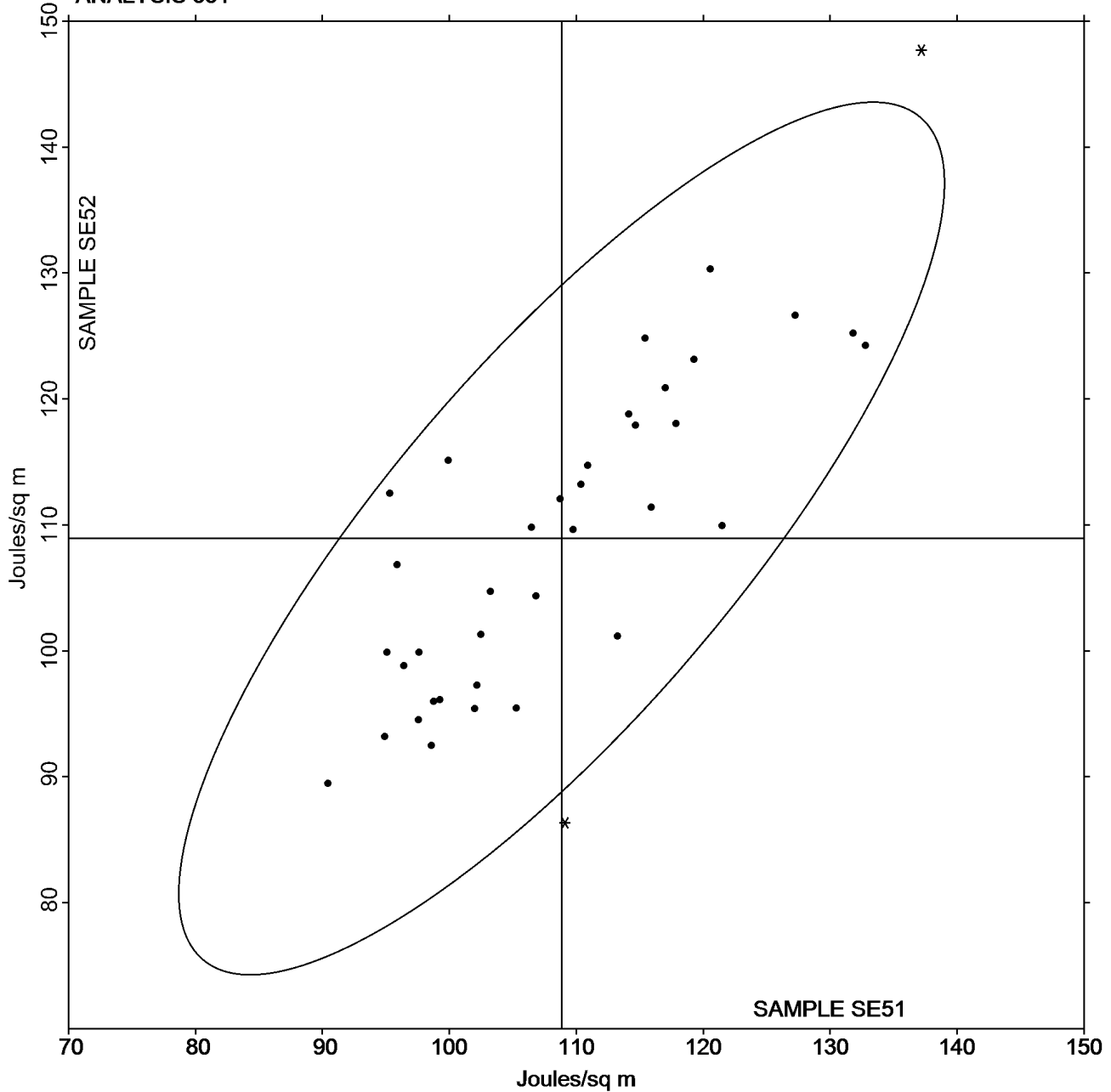
SAMPLE SE52

Joules/sq m

SAMPLE SE51

Joules/sq m

## Analysis 332
## Elongation to Break - Packaging Papers
### TAPPI Official Test Method T494

| WebCode | Data Flag | Sample SE51 Lab Mean | Diff from Grand Mean | CPV | Sample SE52 Lab Mean | Diff from Grand Mean | CPV | Instr Code |
|---------|-----------|----------|----------------------|-----|----------|----------------------|-----|------------|
| 2RN8QK | X | 2.340 | 0.481 | 2.22 | 2.150 | 0.285 | 1.13 | TO |
| 3C7H9A | | 1.980 | 0.121 | 0.56 | 1.975 | 0.110 | 0.44 | TB |
| 62KB9C | | 1.775 | -0.084 | -0.39 | 1.728 | -0.137 | -0.54 | LH |
| 6ETWUP | | 1.745 | -0.114 | -0.53 | 1.670 | -0.195 | -0.77 | TB |
| 7AWF63 | | 1.849 | -0.010 | -0.05 | 1.824 | -0.041 | -0.16 | TO |
| 7DUY82 | | 1.842 | -0.017 | -0.08 | 1.825 | -0.040 | -0.16 | TK |
| 8E4NLX | | 1.674 | -0.185 | -0.85 | 1.823 | -0.042 | -0.17 | LE |
| 8PL4J7 | | 1.674 | -0.185 | -0.85 | 1.654 | -0.211 | -0.84 | XX |
| A728ZH | | 1.572 | -0.287 | -1.33 | 1.579 | -0.286 | -1.13 | LW |
| AYH22P | | 2.012 | 0.153 | 0.71 | 2.178 | 0.313 | 1.24 | IF |
| BRBV2D | | 1.831 | -0.028 | -0.13 | 1.790 | -0.075 | -0.30 | ID |
| BX26DW | | 1.799 | -0.060 | -0.28 | 1.804 | -0.061 | -0.24 | TR |
| C22NZV | | 1.939 | 0.080 | 0.37 | 1.963 | 0.098 | 0.39 | XX |
| CA9CPM | | 2.190 | 0.331 | 1.53 | 2.192 | 0.327 | 1.30 | IK |
| CZN46Z | | 1.889 | 0.030 | 0.14 | 1.967 | 0.102 | 0.40 | TO |
| DMD4UT | | 1.708 | -0.151 | -0.70 | 1.719 | -0.146 | -0.58 | XX |
| E4GX2R | | 1.756 | -0.103 | -0.48 | 1.777 | -0.088 | -0.35 | LH |
| E6RQTL | | 1.814 | -0.045 | -0.21 | 1.909 | 0.044 | 0.17 | LE |
| EHXV7T | | 2.109 | 0.250 | 1.16 | 2.149 | 0.284 | 1.13 | IM |
| FC2KF2 | | 1.624 | -0.235 | -1.09 | 1.721 | -0.144 | -0.57 | TA |
| G8BKMR | | 1.694 | -0.165 | -0.76 | 1.707 | -0.158 | -0.63 | LA |
| GAVELD | | 1.702 | -0.157 | -0.72 | 1.657 | -0.208 | -0.82 | TB |
| GXK27X | * | 2.318 | 0.459 | 2.12 | 2.496 | 0.631 | 2.50 | TP |
| J3A8UY | | 1.615 | -0.244 | -1.13 | 1.659 | -0.206 | -0.82 | LA |
| J4HFWR | | 1.869 | 0.010 | 0.05 | 1.838 | -0.027 | -0.11 | IP |
| JAQMTN | | 1.876 | 0.017 | 0.08 | 1.761 | -0.104 | -0.41 | IM |
| L68JNP | | 2.205 | 0.346 | 1.60 | 2.255 | 0.390 | 1.55 | TH |
| LU2H6Q | X | 2.220 | 0.361 | 1.67 | 1.870 | 0.005 | 0.02 | IN |
| MVZ4FW | | 1.745 | -0.114 | -0.52 | 1.739 | -0.126 | -0.50 | ID |
| NGTGJK | | 1.773 | -0.086 | -0.40 | 1.786 | -0.079 | -0.31 | TH |
| Q6ATTH | X | 105.761 | 103.902 | 480.04 | 105.630 | 103.765 | 411.28 | TR |
| QAKT23 | | 1.690 | -0.169 | -0.78 | 1.615 | -0.250 | -0.99 | LE |
| QEWXEN | | 1.972 | 0.113 | 0.52 | 1.970 | 0.105 | 0.42 | TT |
| T23C8J | | 1.656 | -0.203 | -0.94 | 1.581 | -0.284 | -1.13 | LE |
| TCGDJJ | | 2.100 | 0.241 | 1.11 | 2.063 | 0.198 | 0.79 | XX |
| TCZ23Y | | 1.478 | -0.381 | -1.76 | 1.466 | -0.399 | -1.58 | LH |
| UYGR3F | | 1.722 | -0.137 | -0.63 | 1.609 | -0.256 | -1.01 | LW |
| VEFB6W | | 1.743 | -0.116 | -0.54 | 1.641 | -0.224 | -0.89 | LA |
| WNZ26T | * | 2.196 | 0.337 | 1.56 | 2.413 | 0.548 | 2.17 | DW |
| XLVLJ9 | | 1.792 | -0.067 | -0.31 | 1.726 | -0.139 | -0.55 | LE |

**Paper & Paperboard Interlaboratory Testing Program**
**Analysis 332**
**Elongation to Break - Packaging Papers**
**TAPPI Official Test Method T494**

**Report #2921S, January 2018**

| WebCode | Data Flag | Sample SE51 | | | Sample SE52 | | | Instr Code |
|---------|-----------|-------------|------------------------|-----|-------------|------------------------|-----|------------|
| | | Lab Mean | Diff from Grand Mean | CPV | Lab Mean | Diff from Grand Mean | CPV | |
| XX3QDH | * | 2.420 | 0.561 | 2.59 | 2.440 | 0.575 | 2.28 | XX |
| YH8MAJ | | 2.148 | 0.289 | 1.34 | 2.062 | 0.197 | 0.78 | TH |

| Summary Statistics | Sample SE51 | Sample SE52 |
|--------------------|-------------|-------------|
| **Grand Means** | 1.86 Percent | 1.86 Percent |
| **Stnd Dev Btwn Labs** | 0.22 Percent | 0.25 Percent |

Statistics based on 39 of 42 reporting participants.

## Comments on Assigned Data Flags for Test #332

Q6ATTH (X) - Extreme Data.

2RN8QK (X) - Inconsistent in testing between samples.

LU2H6Q (X) - Inconsistent in testing between samples. Inconsistent within the determinations of both samples.

## Analysis Notes:

Q6ATTH - Data appears to be transposed between Analysis 331 (TEA) and Analysis 332 (% elongation).

## Key to Instrument Codes Reported by Participants

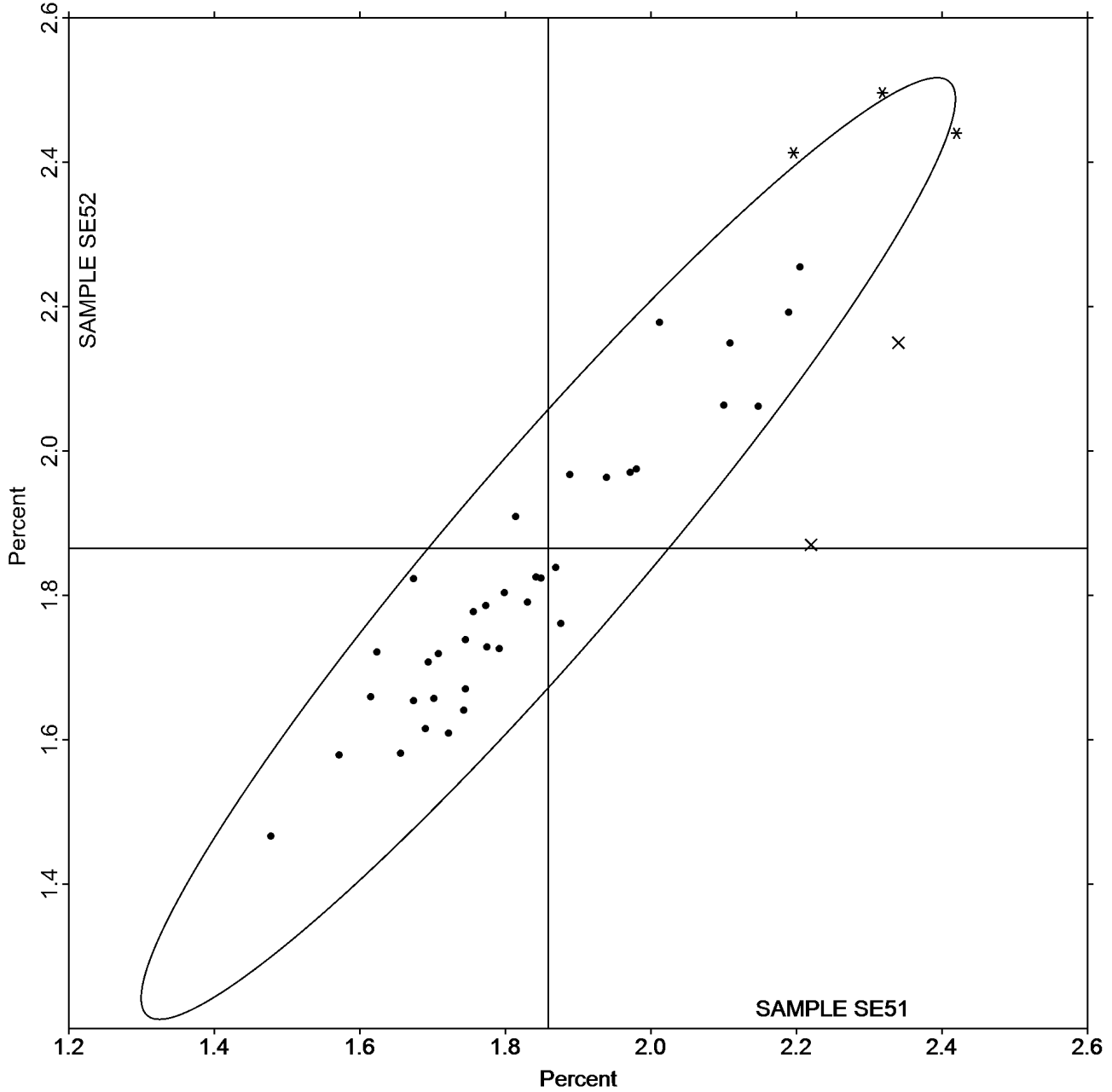| | | | |
|----|----------------------------------|----|------------------------------------|
| DW | Dongguan Walter W-304 Tester | ID | Instron 4201 |
| IF | Instron 3340 Series | IK | Instron 4400 Series |
| IM | Instron 5500 Series | IN | Instron 3360 Series |
| IP | Instron 4206 | LA | L & W Autoline 300 |
| LE | L & W Tensile Tester 066 | LH | L & W Alwetron TH1 (Horizontal) SE 060 |
| LW | L & W Tensile Tester SE062 | TA | Thwing-Albert Tensile Tester |
| TB | Thwing-Albert EJA/1000 | TH | Thwing-Albert QC-3A |
| TK | Thwing-Albert Model 37-4 | TO | Thwing-Albert QC-1000 |
| TP | TMI Monitor/Tensile 100 (84-21-01) | TR | TMI Horizontal Tensile Tester |
| TT | Tinius Olsen Model MHT | XX | Instrument make/model not specified by lab |

**Paper & Paperboard Interlaboratory Testing Program**
**Analysis 332**
**Elongation to Break - Packaging Papers**
**TAPPI Official Test Method T494**

**Report #2921S,
January 2018**

**Grand Mean Sample SE51 = 1.8589
Percent**

**Grand Mean Sample SE52 = 1.8649
Percent**



ANALYSIS 332

SAMPLE SE52

Percent

SAMPLE SE51

Percent

# Paper & Paperboard Interlaboratory Testing Program
## Analysis 334
## Folding Endurance (MIT) - Double Folds
### TAPPI Official Test Method T511

| WebCode | Data Flag | Sample SG51 Lab Mean | Sample SG51 Diff from Grand Mean | Sample SG51 CPV | Sample SG52 Lab Mean | Sample SG52 Diff from Grand Mean | Sample SG52 CPV | Instr Code |
|---|---|---|---|---|---|---|---|---|
| 6PQX9F  |  | 56.60 | 11.52  | 0.96  | 61.30 | 15.69  | 1.22  | MT |
| A4UP3M  |  | 52.50 | 7.42   | 0.62  | 46.40 | 0.79   | 0.06  | MT |
| A728ZH  |  | 72.20 | 27.12  | 2.25  | 66.40 | 20.79  | 1.62  | MT |
| C22NZV  |  | 56.00 | 10.92  | 0.91  | 53.90 | 8.29   | 0.65  | MT |
| GAVELD  |  | 33.50 | -11.58 | -0.96 | 37.90 | -7.71  | -0.60 | MT |
| J8JEDC  |  | 40.90 | -4.18  | -0.35 | 47.30 | 1.69   | 0.13  | MT |
| JQYQ73  |  | 44.70 | -0.38  | -0.03 | 39.80 | -5.81  | -0.45 | MT |
| L68JNP  |  | 28.50 | -16.58 | -1.38 | 23.70 | -21.91 | -1.71 | MT |
| LDYWL4  |  | 43.50 | -1.58  | -0.13 | 51.60 | 5.99   | 0.47  | MT |
| R69427  |  | 48.80 | 3.72   | 0.31  | 52.30 | 6.69   | 0.52  | MT |
| TGFMXR  |  | 35.20 | -9.88  | -0.82 | 34.50 | -11.11 | -0.87 | XX |
| XALXHY  |  | 33.40 | -11.68 | -0.97 | 25.50 | -20.11 | -1.57 | MT |
| ZH834V  |  | 40.30 | -4.78  | -0.40 | 52.30 | 6.69   | 0.52  | MT |

| Summary Statistics | Sample SG51 | Sample SG52 |
|---|---|---|
| **Grand Means** | 45.08 Double Folds | 45.61 Double Folds |
| **Stnd Dev Btwn Labs** | 12.05 Double Folds | 12.84 Double Folds |

Statistics based on 13 of 13 reporting participants.

## Key to Instrument Codes Reported by Participants

| | | | |
|---|---|---|---|
| MT | MIT - Tinius Olsen | XX | Instrument make/model not specified by lab |

**Paper & Paperboard Interlaboratory Testing Program**
**Analysis 334**
**Folding Endurance (MIT) - Double Folds**
**TAPPI Official Test Method T511**

**Report #2921S,**
**January 2018**

**Grand Mean Sample SG51 = 45.085**
**Double Folds**

**Grand Mean Sample SG52 = 45.608**
**Double Folds**



If fewer than 20 laboratories are included in an analysis, a control ellipse will not be drawn on the two-sample plot.

# Paper & Paperboard Interlaboratory Testing Program
## Analysis 336
## Bending Resistance, Gurley Type
### TAPPI Official Test Method T543

| WebCode | Data Flag | Sample SH51 | | | Sample SH52 | | |
|---|---|---|---|---|---|---|---|
| | | Lab Mean | Diff from Grand Mean | CPV | Lab Mean | Diff from Grand Mean | CPV |
| 4U9N6B | | 312.0 | 11.4 | 0.44 | 311.2 | 18.9 | 0.81 |
| 6AHWL6 | | 278.0 | -22.6 | -0.88 | 272.4 | -19.8 | -0.85 |
| 6ETWUP | | 253.7 | -46.9 | -1.82 | 249.3 | -42.9 | -1.84 |
| 9MTKZJ | | 345.8 | 45.2 | 1.75 | 325.8 | 33.5 | 1.44 |
| A4UP3M | | 299.3 | -1.3 | -0.05 | 297.5 | 5.2 | 0.22 |
| AYH22P | | 341.9 | 41.3 | 1.60 | 320.8 | 28.5 | 1.22 |
| C22NZV | X | 172.1 | -128.5 | -4.99 | 157.6 | -134.6 | -5.77 |
| CJVHFZ | X | 328.5 | 27.9 | 1.08 | 616.8 | 324.5 | 13.91 |
| GAVELD | X | 131.7 | -168.9 | -6.55 | 277.4 | -14.9 | -0.64 |
| H6ZTFW | | 286.5 | -14.1 | -0.55 | 274.0 | -18.3 | -0.78 |
| HHLG3F | | 305.4 | 4.8 | 0.19 | 277.8 | -14.4 | -0.62 |
| J8JEDC | X | 422.5 | 121.9 | 4.73 | 405.3 | 113.0 | 4.85 |
| KPGAAZ | | 290.8 | -9.8 | -0.38 | 283.6 | -8.7 | -0.37 |
| L98KYK | | 325.5 | 24.9 | 0.97 | 303.5 | 11.2 | 0.48 |
| MMHR3V | | 324.9 | 24.3 | 0.94 | 327.6 | 35.3 | 1.51 |
| MU6BTP | | 277.5 | -23.1 | -0.90 | 267.2 | -25.0 | -1.07 |
| TGFMXR | | 290.7 | -9.9 | -0.38 | 305.4 | 13.1 | 0.56 |
| VHNE4E | | 276.9 | -23.6 | -0.92 | 275.8 | -16.4 | -0.70 |
| WLZTZJ | | 300.0 | -0.6 | -0.02 | 292.0 | -0.2 | -0.01 |

| Summary Statistics | Sample SH51 | Sample SH52 |
|---|---|---|
| Grand Means | 300.59 Gurley Units | 292.26 Gurley Units |
| Stnd Dev Btwn Labs | 25.78 Gurley Units | 23.33 Gurley Units |

Statistics based on 15 of 19 reporting participants.

## Comments on Assigned Data Flags for Test #336

C22NZV (X) - Data for both samples are low. Possible Systematic Error.

J8JEDC (X) - Data for both samples are high. Possible Systematic Error. Inconsistent within the determinations of bot samples.

GAVELD (X) - Extreme Data for Sample SH51.
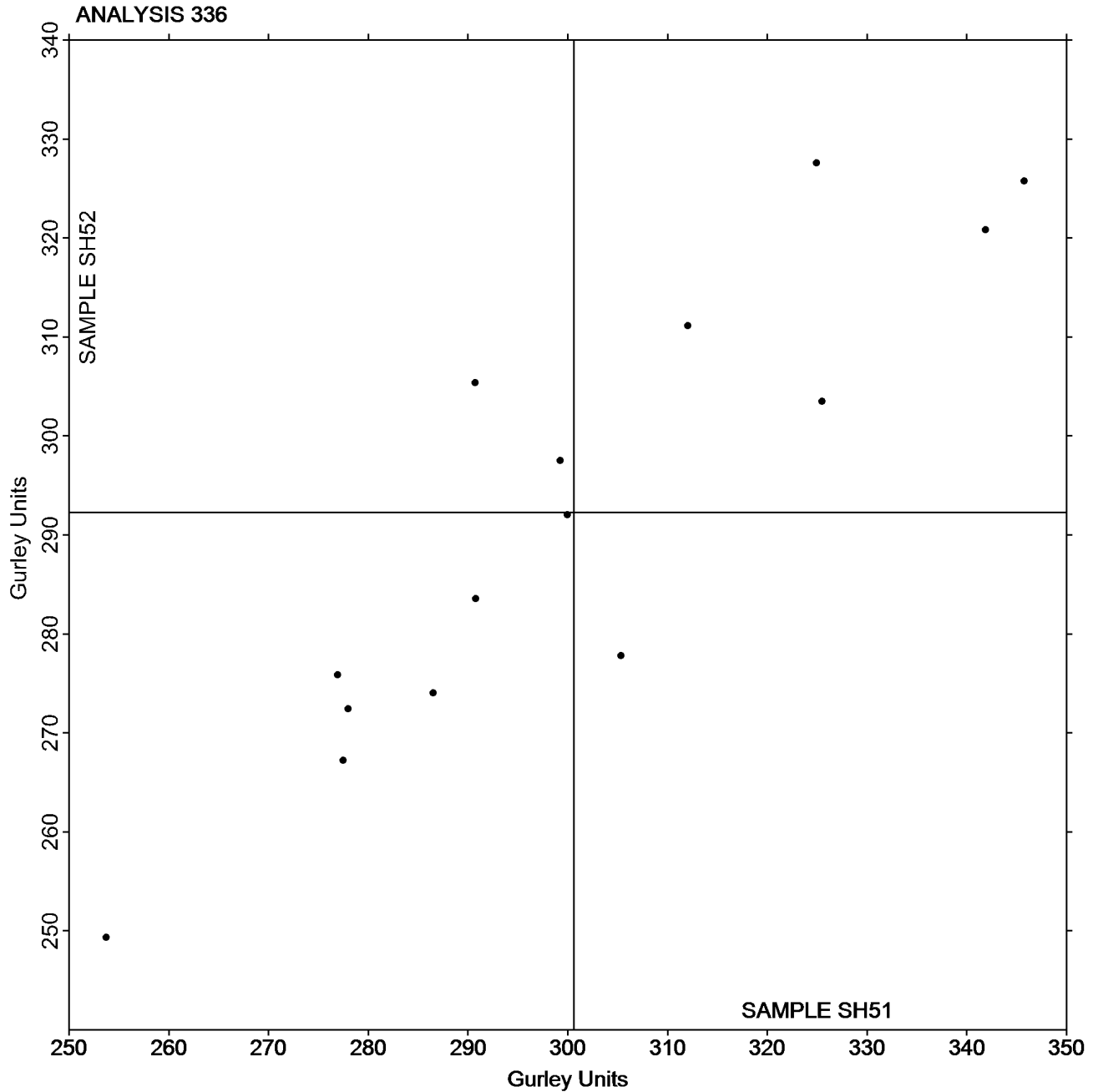
CJVHFZ (X) - Extreme Data for Sample SH52.

**Paper & Paperboard Interlaboratory Testing Program**
**Analysis 336**
**Bending Resistance, Gurley Type**
**TAPPI Official Test Method T543**

**Report #2921S,**
**January 2018**

**Grand Mean Sample SH51 = 300.59**
**Gurley Units**

**Grand Mean Sample SH52 = 292.26**
**Gurley Units**



If fewer than 20 laboratories are included in an analysis, a control ellipse will not be drawn on the two-sample plot.

**Paper & Paperboard Interlaboratory Testing Program**
**Analysis 338**
**Bending Resistance, Taber Type - 0 to 10 Units**
**TAPPI Official Test Method T566**

**Report #2921S,**
**January 2018**

| | | Sample SJ51 | | | Sample SJ52 | | |
|---|---|---|---|---|---|---|---|
| WebCode | Data Flag | Lab Mean | Diff from Grand Mean | CPV | Lab Mean | Diff from Grand Mean | CPV |
| 4U9N6B | | 4.255 | 0.145 | 0.33 | 3.916 | -0.177 | -0.37 |
| 6YXGN6 | | 3.723 | -0.387 | -0.89 | 3.901 | -0.192 | -0.40 |
| 8N7VEC | | 4.018 | -0.092 | -0.21 | 4.024 | -0.069 | -0.14 |
| 8V3RZT | | 4.576 | 0.466 | 1.07 | 4.753 | 0.660 | 1.39 |
| A4UP3M | | 4.199 | 0.089 | 0.20 | 3.987 | -0.106 | -0.22 |
| AYH22P | | 4.170 | 0.060 | 0.14 | 4.259 | 0.166 | 0.35 |
| H6EEVZ | | 3.249 | -0.861 | -1.98 | 3.497 | -0.596 | -1.26 |
| M4AENM | | 4.163 | 0.053 | 0.12 | 4.021 | -0.072 | -0.15 |
| TGFMXR | | 4.925 | 0.815 | 1.87 | 5.090 | 0.997 | 2.10 |
| UYGR3F | | 3.830 | -0.280 | -0.64 | 3.500 | -0.593 | -1.25 |
| VHNE4E | | 4.101 | -0.009 | -0.02 | 4.073 | -0.020 | -0.04 |
| XALXHY | X | 4.788 | 0.678 | 1.56 | 4.069 | -0.024 | -0.05 |

| Summary Statistics | Sample SJ51 | Sample SJ52 |
|---|---|---|
| **Grand Means** | 4.11 Taber Units | 4.09 Taber Units |
| **Stnd Dev Btwn Labs** | 0.44 Taber Units | 0.47 Taber Units |

Statistics based on 11 of 12 reporting participants.

**Comments on Assigned Data Flags for Test #338**
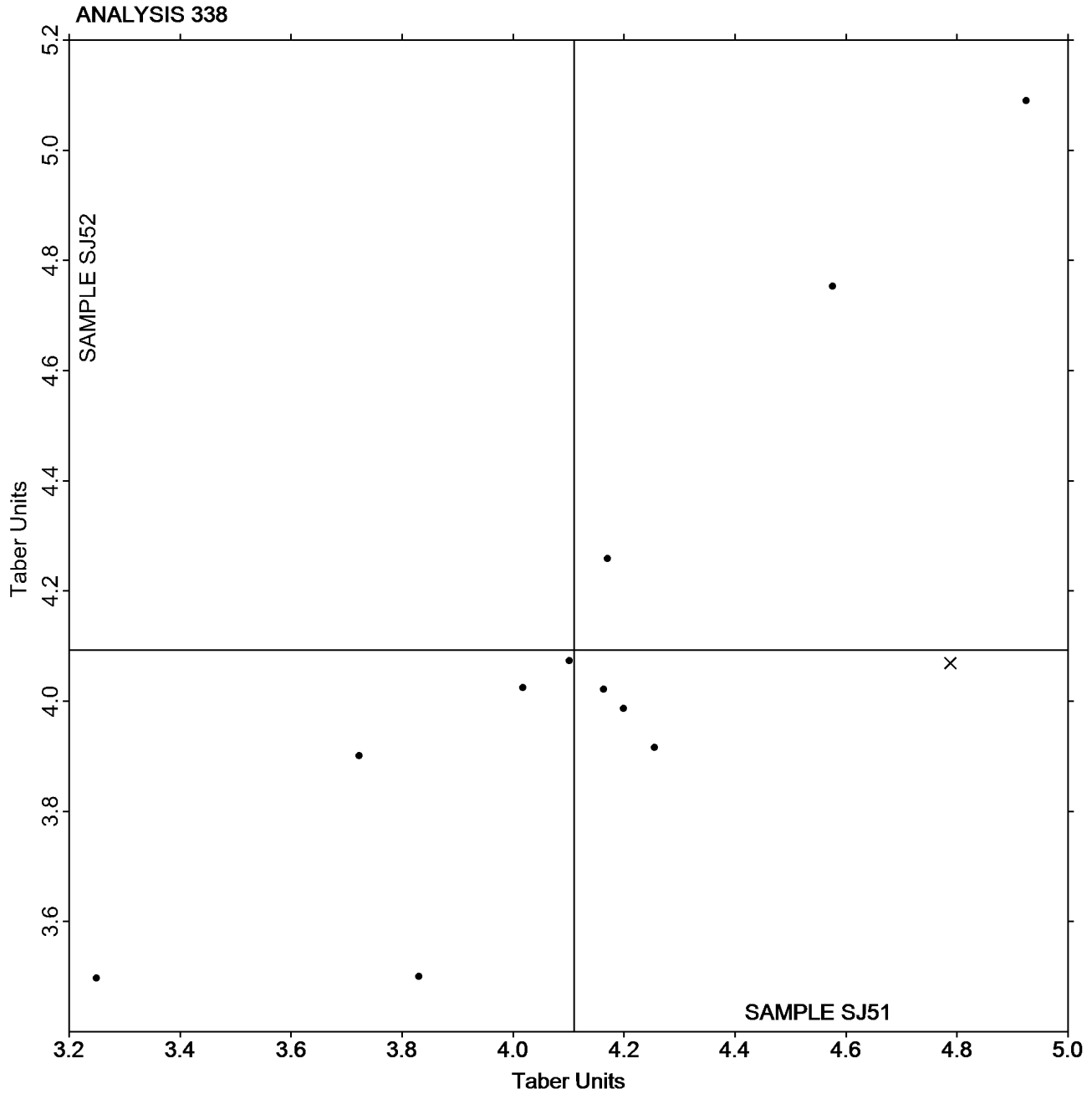
XALXHY (X) - Inconsistent in testing between samples.

**Paper & Paperboard Interlaboratory Testing Program**
**Analysis 338**
**Bending Resistance, Taber Type - 0 to 10 Units**
**TAPPI Official Test Method T566**

**Report #2921S,**
**January 2018**

**Grand Mean Sample SJ51 = 4.1099**
**Taber Units**

**Grand Mean Sample SJ52 = 4.0928**
**Taber Units**



ANALYSIS 338

SAMPLE SJ52

Taber Units

SAMPLE SJ51

Taber Units

If fewer than 20 laboratories are included in an analysis, a control ellipse will not be drawn on the two-sample plot.
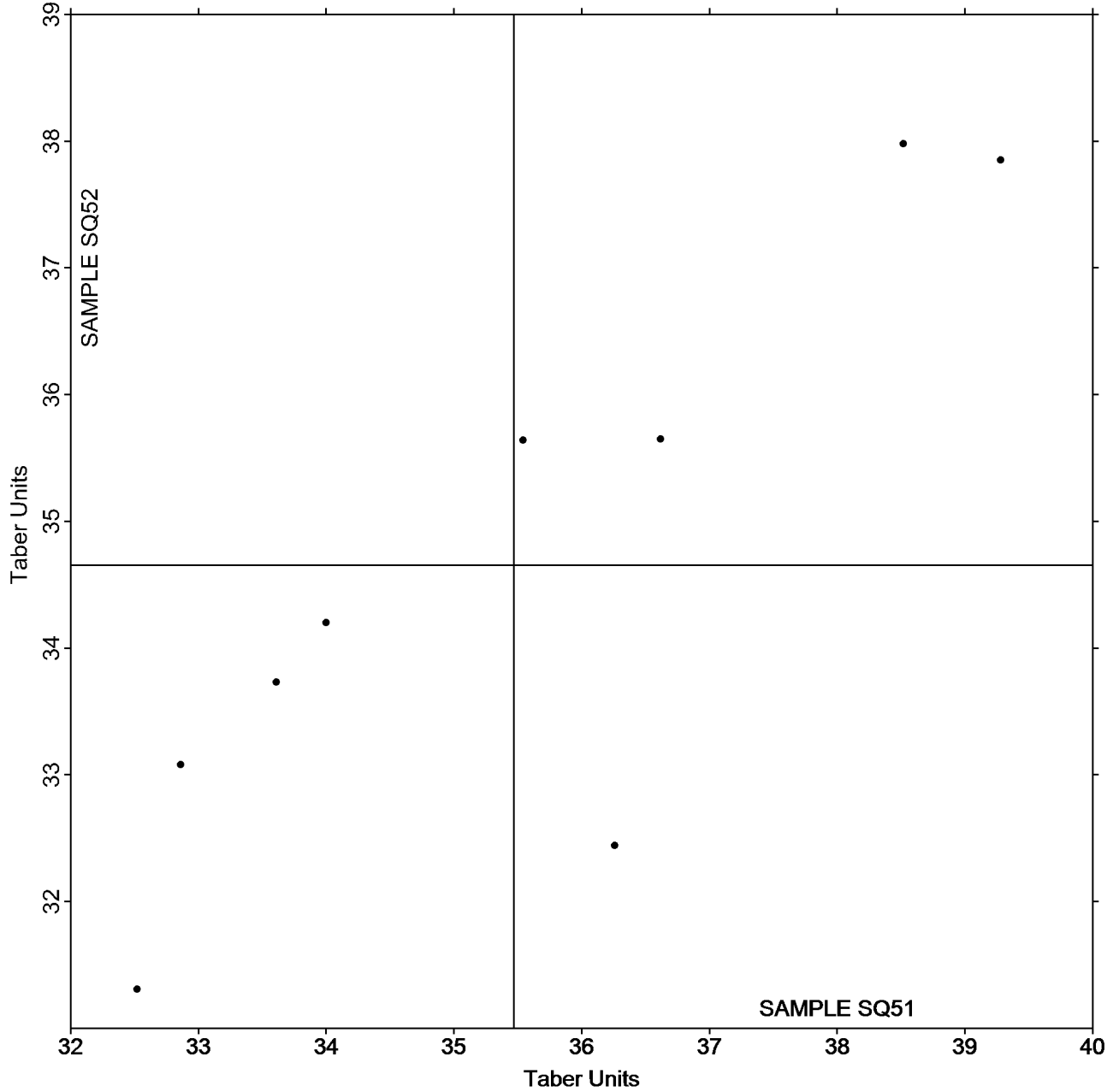
**Paper & Paperboard Interlaboratory Testing Program**
**Analysis 339**
**Bending Resistance, Taber Type - 10 to 100 Taber Units**
**TAPPI Official Test Method T489**

**Report #2921S,**
**January 2018**

| WebCode | Data Flag | Sample SQ51 | | | Sample SQ52 | | |
|---|---|---|---|---|---|---|---|
| | | Lab Mean | Diff from Grand Mean | CPV | Lab Mean | Diff from Grand Mean | CPV |
| 2PK9FT | | 34.00 | -1.47 | -0.61 | 34.20 | -0.45 | -0.20 |
| 3C7H9A | | 36.26 | 0.79 | 0.33 | 32.44 | -2.21 | -0.96 |
| 6PQX9F | | 32.86 | -2.61 | -1.08 | 33.08 | -1.57 | -0.68 |
| A4UP3M | | 36.62 | 1.15 | 0.48 | 35.65 | 1.00 | 0.43 |
| A728ZH | | 38.52 | 3.05 | 1.26 | 37.98 | 3.33 | 1.44 |
| E6RQTL | | 39.28 | 3.81 | 1.57 | 37.85 | 3.20 | 1.38 |
| HHLG3F | | 35.54 | 0.07 | 0.03 | 35.64 | 0.99 | 0.43 |
| MMHR3V | | 33.61 | -1.86 | -0.77 | 33.73 | -0.92 | -0.40 |
| UYGR3F | X | 53.25 | 17.78 | 7.34 | 58.00 | 23.35 | 10.09 |
| ZYTNLZ | | 32.52 | -2.95 | -1.22 | 31.31 | -3.34 | -1.44 |

| Summary Statistics | Sample SQ51 | Sample SQ52 |
|---|---|---|
| **Grand Means** | 35.47 Taber Units | 34.65 Taber Units |
| **Stnd Dev Btwn Labs** | 2.42 Taber Units | 2.31 Taber Units |
| | | Statistics based on 9 of 10 reporting participants. |

### Comments on Assigned Data Flags for Test #339

UYGR3F (X) - Extreme Data.

**Paper & Paperboard Interlaboratory Testing Program**
Analysis 339
**Bending Resistance, Taber Type - 10 to 100 Taber Units**
**TAPPI Official Test Method T489**

**Report #2921S,
January 2018**

**Grand Mean Sample SQ51 = 35.468
Taber Units**

**Grand Mean Sample SQ52 = 34.653
Taber Units**



ANALYSIS 339

SAMPLE SQ52

Taber Units

SAMPLE SQ51

Taber Units

If fewer than 20 laboratories are included in an analysis, a control ellipse will not be drawn on the two-sample plot.

**Paper & Paperboard Interlaboratory Testing Program**
**Analysis 340**
**Bending Resistance, Taber Type - 50 to 500 Taber Units - Recycled Paperboard**
**TAPPI Official Test Method T489**

**Report #2921S,
January 2018**

| WebCode | Data Flag | Sample ST51 | | | Sample ST52 | | |
|---|---|---|---|---|---|---|---|
| | | Lab Mean | Diff from Grand Mean | CPV | Lab Mean | Diff from Grand Mean | CPV |
| 3DYPBL | | 291.2 | -1.5 | -0.09 | 297.5 | 12.0 | 0.70 |
| 6HPMUA | | 291.1 | -1.6 | -0.10 | 277.3 | -8.2 | -0.48 |
| 7LMJ32 | | 331.0 | 38.3 | 2.41 | 327.0 | 41.5 | 2.42 |
| A728ZH | | 311.7 | 19.0 | 1.19 | 302.0 | 16.5 | 0.96 |
| AGJPVA | | 282.7 | -10.0 | -0.63 | 267.9 | -17.6 | -1.03 |
| C22NZV | | 278.8 | -13.9 | -0.87 | 274.1 | -11.4 | -0.66 |
| EXT3E3 | | 278.3 | -14.4 | -0.91 | 271.3 | -14.2 | -0.83 |
| GXK27X | | 276.8 | -15.9 | -1.00 | 274.9 | -10.6 | -0.62 |
| HHLG3F | | 294.3 | 1.6 | 0.10 | 286.9 | 1.3 | 0.08 |
| L68JNP | | 308.8 | 16.1 | 1.01 | 313.1 | 27.6 | 1.61 |
| LDJHFF | | 297.4 | 4.7 | 0.30 | 291.2 | 5.7 | 0.33 |
| Q6ATTH | | 267.2 | -25.5 | -1.60 | 257.7 | -27.8 | -1.62 |
| QUT7JH | | 293.6 | 0.9 | 0.06 | 280.6 | -4.9 | -0.29 |
| UYGR3F | | 282.5 | -10.2 | -0.64 | 280.0 | -5.5 | -0.32 |
| VUCP6P | * | 312.2 | 19.5 | 1.23 | 277.2 | -8.3 | -0.48 |
| XB9WCM | | 286.9 | -5.8 | -0.37 | 282.4 | -3.1 | -0.18 |
| YT947F | | 291.5 | -1.2 | -0.07 | 292.5 | 7.0 | 0.41 |

| Summary Statistics | Sample ST51 | Sample ST52 |
|---|---|---|
| **Grand Means** | 292.70 Taber Units | 285.50 Taber Units |
| **Stnd Dev Btwn Labs** | 15.89 Taber Units | 17.16 Taber Units |

Statistics based on 17 of 17 reporting participants.

# Paper & Paperboard Interlaboratory Testing Program
## Analysis 340
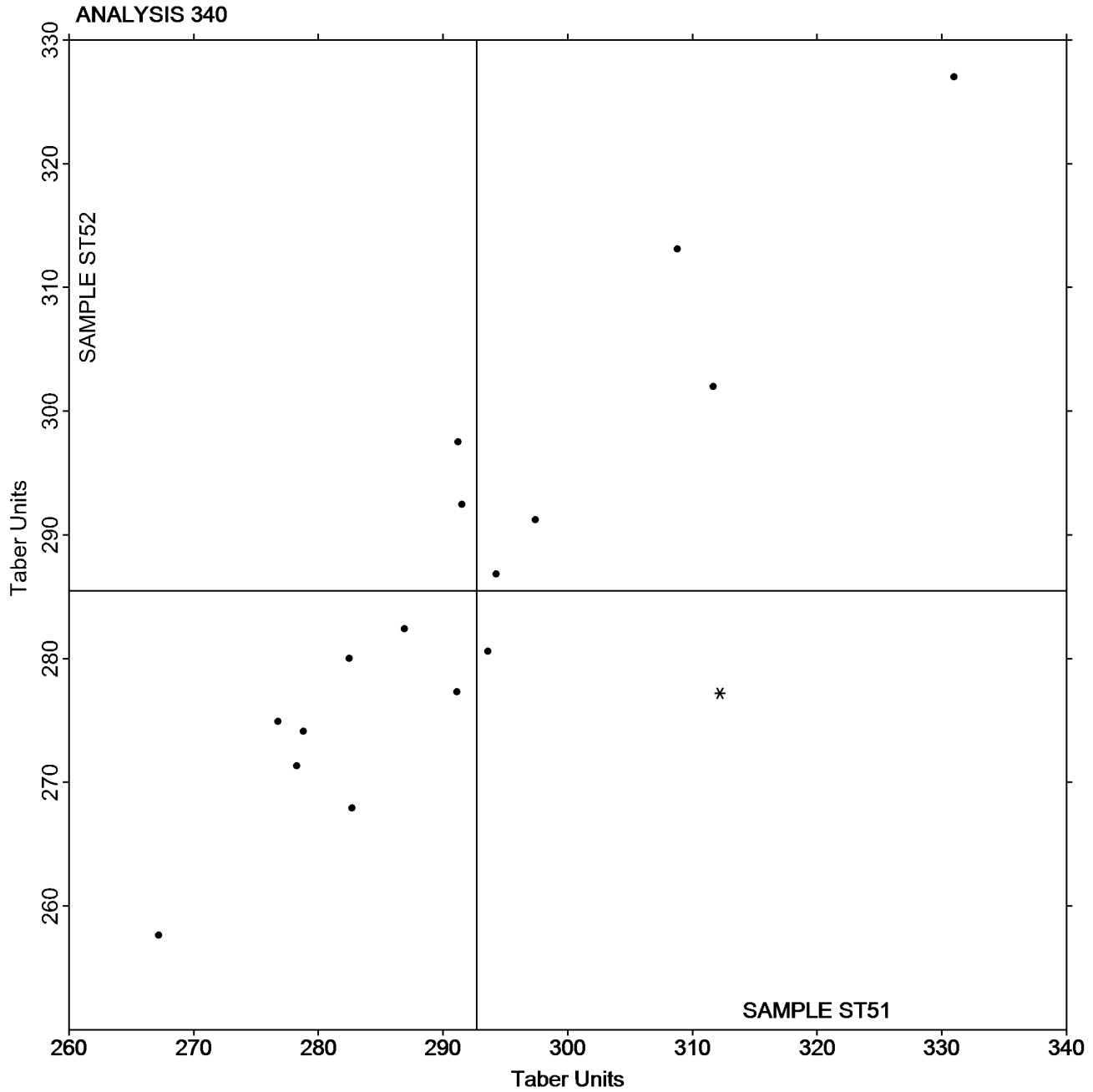### Bending Resistance, Taber Type - 50 to 500 Taber Units - Recycled Paperboard
## TAPPI Official Test Method T489

**Report #2921S,
January 2018**

**Grand Mean Sample ST51 = 292.70
Taber Units**

**Grand Mean Sample ST52 = 285.50
Taber Units**



If fewer than 20 laboratories are included in an analysis, a control ellipse will not be drawn on the two-sample plot.

# Paper & Paperboard Interlaboratory Testing Program
## Analysis 343
## Z-Direction Tensile
### TAPPI Official Test Method T541

| WebCode | Data Flag | Sample SM51 Lab Mean | Sample SM51 Diff from Grand Mean | Sample SM51 CPV | Sample SM52 Lab Mean | Sample SM52 Diff from Grand Mean | Sample SM52 CPV | Instr Code |
|---------|-----------|----------|---------------------|-------|----------|---------------------|-------|------|
| 2RN8QK | | 68.00 | -1.00 | -0.20 | 66.20 | -2.76 | -0.54 | TA |
| 3C7H9A | | 65.50 | -3.50 | -0.70 | 66.44 | -2.52 | -0.49 | TA |
| 7E69PZ | | 76.64 | 7.64 | 1.53 | 77.70 | 8.74 | 1.70 | DX |
| A4UP3M | | 62.22 | -6.78 | -1.35 | 63.56 | -5.40 | -1.05 | TZ |
| A728ZH | | 73.58 | 4.58 | 0.92 | 72.52 | 3.56 | 0.69 | LW |
| AYH22P | | 73.35 | 4.35 | 0.87 | 73.80 | 4.84 | 0.94 | TL |
| BM2ETP | | 73.34 | 4.34 | 0.87 | 74.44 | 5.48 | 1.07 | TA |
| E6RQTL | | 69.66 | 0.66 | 0.13 | 66.86 | -2.10 | -0.41 | TA |
| GXK27X | | 61.12 | -7.88 | -1.57 | 62.69 | -6.27 | -1.22 | LX |
| HP6KC3 | | 68.00 | -1.00 | -0.20 | 68.00 | -0.96 | -0.19 | XX |
| K8EGH7 | | 61.35 | -7.65 | -1.53 | 61.26 | -7.69 | -1.50 | LW |
| L68JNP | | 66.14 | -2.86 | -0.57 | 64.32 | -4.64 | -0.90 | LW |
| P39EJ8 | | 74.82 | 5.82 | 1.16 | 75.68 | 6.72 | 1.31 | DX |
| QUT7JH | | 72.20 | 3.20 | 0.64 | 72.40 | 3.44 | 0.67 | CA |
| ZYTNLZ | | 69.04 | 0.05 | 0.01 | 68.48 | -0.48 | -0.09 | LW |

| Summary Statistics | Sample SM51 | Sample SM52 |
|--------------------|-------------|-------------|
| **Grand Means** | 69.00 psi | 68.96 psi |
| **Stnd Dev Btwn Labs** | 5.01 psi | 5.13 psi |

Statistics based on 15 of 15 reporting participants.

## Key to Instrument Codes Reported by Participants

| | | | |
|---|---|---|---|
| CA | CSI CS-163 | DX | Dek-Tron XP2 Series |
| LW | L & W ZD Tensile Tester | LX | L & W (model not specified) |
| TA | Thwing-Albert Tensile Tester | TL | TMI Lab Master |
| TZ | TMI Monitor/ZDT Tester | XX | Instrument make/model not specified by lab |

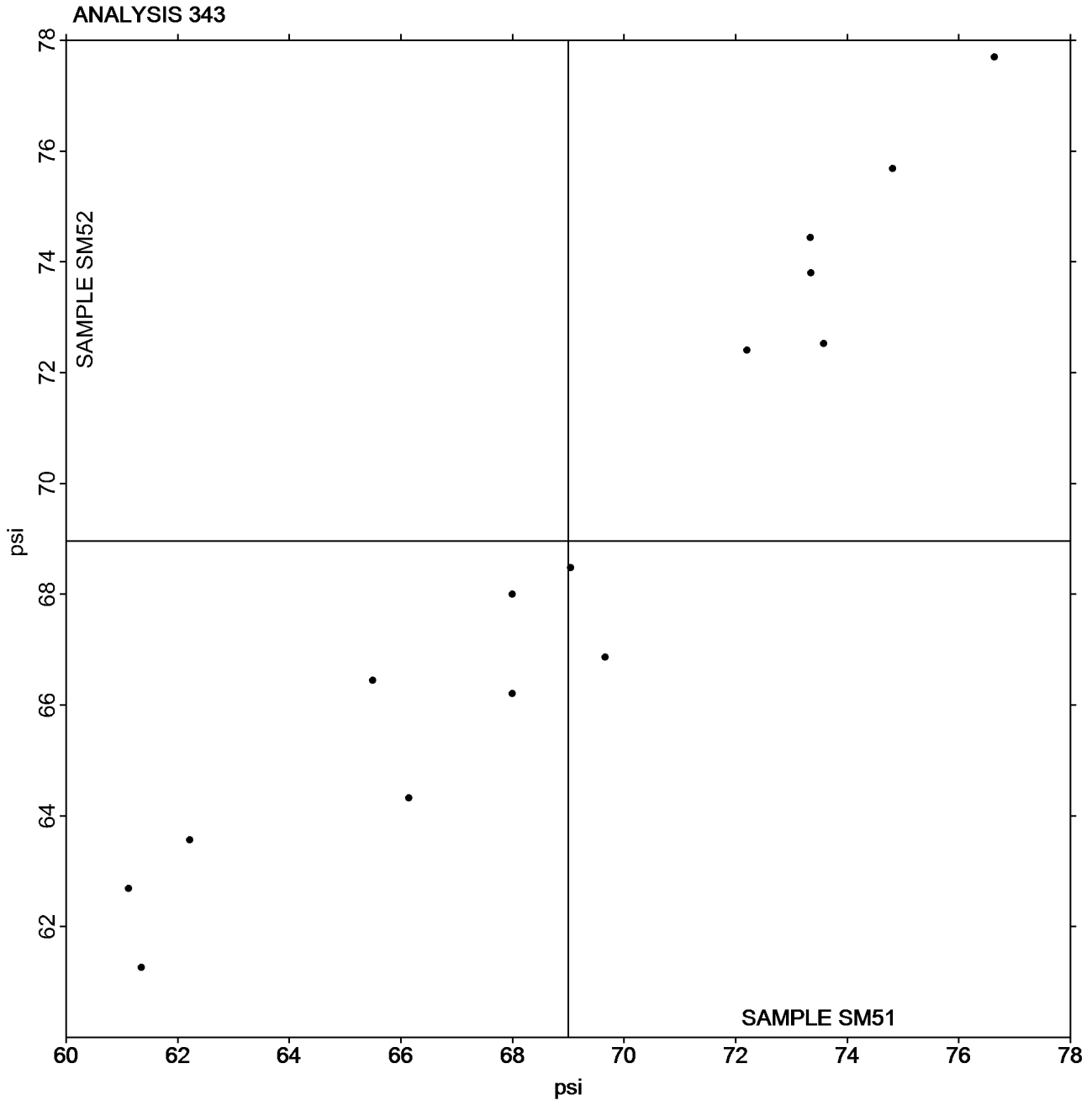# Paper & Paperboard Interlaboratory Testing Program
## Analysis 343
## Z-Direction Tensile
## TAPPI Official Test Method T541

**Report #2921S,
January 2018**

**Grand Mean Sample SM51 = 68.997 psi**

**Grand Mean Sample SM52 = 68.956 psi**



ANALYSIS 343

SAMPLE SM52

SAMPLE SM51

psi

psi

If fewer than 20 laboratories are included in an analysis, a control ellipse will not be drawn on the two-sample plot.

# Paper & Paperboard Interlaboratory Testing Program
## Analysis 345
## Z-Direction Tensile, Recycled Paperboard
### TAPPI Official Test Method T541

**Report #2921S,
January 2018**

|  |  | Sample SZ51 | | | | Sample SZ52 | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| WebCode | Data Flag | Lab Mean | Diff from Grand Mean | CPV | | Lab Mean | Diff from Grand Mean | CPV | Instr Code |
| 6HPMUA |  | 36.86 | 1.55 | 0.52 | | 36.06 | 0.62 | 0.20 | TZ |
| 8RQVHY |  | 29.32 | -5.99 | -1.99 | | 31.84 | -3.60 | -1.16 | LW |
| AGJPVA |  | 33.94 | -1.37 | -0.45 | | 32.02 | -3.42 | -1.11 | TL |
| BW7L8P |  | 35.74 | 0.43 | 0.14 | | 35.56 | 0.12 | 0.04 | CD |
| C22NZV |  | 34.04 | -1.27 | -0.42 | | 34.28 | -1.16 | -0.38 | CA |
| CA9CPM |  | 41.55 | 6.24 | 2.08 | | 42.58 | 7.14 | 2.31 | PG |
| EXT3E3 |  | 35.44 | 0.13 | 0.04 | | 34.46 | -0.98 | -0.32 | TA |
| G8BKMR |  | 36.77 | 1.46 | 0.49 | | 36.21 | 0.76 | 0.25 | TA |
| GJL7UR |  | 33.46 | -1.85 | -0.61 | | 32.20 | -3.24 | -1.05 | LW |
| HHLG3F |  | 33.08 | -2.23 | -0.74 | | 32.44 | -3.00 | -0.97 | CA |
| LDJHFF |  | 35.32 | 0.01 | 0.00 | | 36.78 | 1.34 | 0.43 | CD |
| PVLNYX |  | 36.86 | 1.55 | 0.52 | | 36.42 | 0.98 | 0.32 | CH |
| VUCP6P |  | 31.20 | -4.11 | -1.37 | | 32.80 | -2.64 | -0.85 | LW |
| XB9WCM |  | 37.20 | 1.89 | 0.63 | | 38.40 | 2.96 | 0.95 | CA |
| YT947F |  | 38.80 | 3.49 | 1.16 | | 39.60 | 4.16 | 1.34 | TA |

| Summary Statistics | Sample SZ51 | Sample SZ52 |
| --- | --- | --- |
| **Grand Means** | 35.31 psi | 35.44 psi |
| **Stnd Dev Btwn Labs** | 3.01 psi | 3.10 psi |

Statistics based on 15 of 15 reporting participants.

## Key to Instrument Codes Reported by Participants

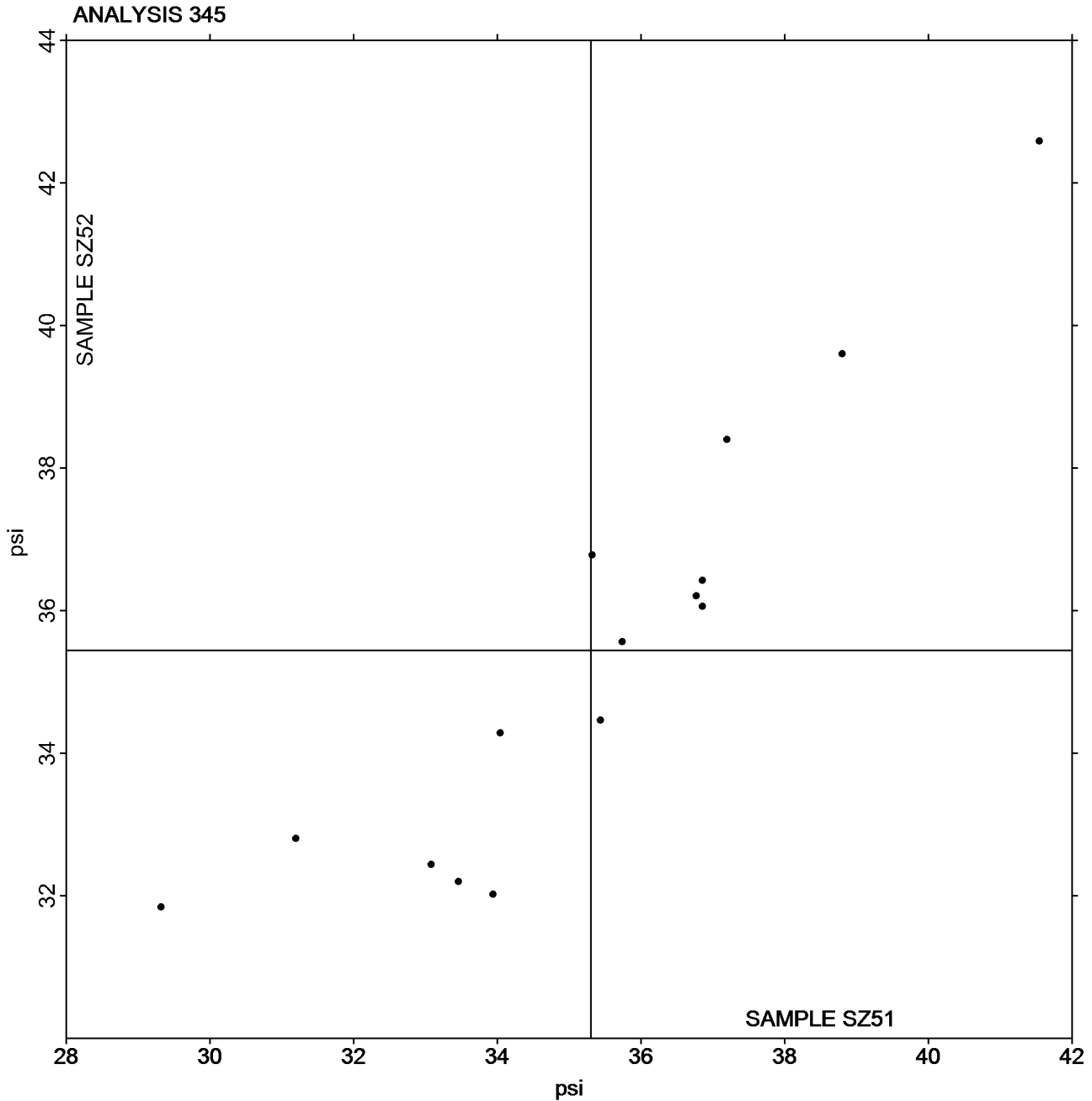| | | | |
| --- | --- | --- | --- |
| CA | CSI CS-163 | CD | CSI CS-163D |
| CH | Chatillon Ametek | LW | L & W ZD Tensile Tester |
| PG | Perkins Model A Mullen Tester | TA | Thwing-Albert Tensile Tester |
| TL | TMI Lab Master | TZ | TMI Monitor/ZDT Tester |

**Paper & Paperboard Interlaboratory Testing Program**
**Analysis 345**
**Z-Direction Tensile, Recycled Paperboard**
**TAPPI Official Test Method T541**

**Report #2921S,**
**January 2018**

**Grand Mean Sample SZ51 = 35.305 psi**

**Grand Mean Sample SZ52 = 35.443 psi**



If fewer than 20 laboratories are included in an analysis, a control ellipse will not be drawn on the two-sample plot.

| WebCode | Data Flag | Sample SN51 Lab Mean | Sample SN51 Diff from Grand Mean | Sample SN51 CPV | Sample SN52 Lab Mean | Sample SN52 Diff from Grand Mean | Sample SN52 CPV | Instr Code |
|---|---|---|---|---|---|---|---|---|
| 3C7H9A | | 82.80 | -10.30 | -1.90 | 89.00 | -4.67 | -0.87 | HZ |
| 4U9N6B | | 88.72 | -4.38 | -0.81 | 89.32 | -4.35 | -0.81 | KR |
| 6ETWUP | | 91.60 | -1.50 | -0.28 | 93.58 | -0.09 | -0.02 | HY |
| 6PQX9F | X | 71.80 | -21.31 | -3.93 | 70.60 | -23.08 | -4.30 | TM |
| 7AWF63 | | 89.00 | -4.10 | -0.76 | 91.20 | -2.47 | -0.46 | HY |
| A4UP3M | | 98.20 | 5.10 | 0.94 | 95.20 | 1.53 | 0.28 | HY |
| A728ZH | | 95.00 | 1.90 | 0.35 | 96.60 | 2.93 | 0.55 | HY |
| BM2ETP | | 102.00 | 8.90 | 1.64 | 101.20 | 7.53 | 1.40 | HY |
| C22NZV | | 97.84 | 4.74 | 0.87 | 95.24 | 1.57 | 0.29 | HZ |
| CKUJNC | | 100.04 | 6.94 | 1.28 | 101.20 | 7.53 | 1.40 | HY |
| E6RQTL | | 95.20 | 2.10 | 0.39 | 99.40 | 5.73 | 1.07 | HY |
| EXT3E3 | | 91.40 | -1.70 | -0.31 | 89.80 | -3.87 | -0.72 | HY |
| J8JEDC | | 89.20 | -3.90 | -0.72 | 87.80 | -5.87 | -1.09 | HY |
| L68JNP | | 90.40 | -2.70 | -0.50 | 89.60 | -4.07 | -0.76 | HZ |
| L724FV | | 99.60 | 6.50 | 1.20 | 100.80 | 7.13 | 1.33 | HZ |
| MTUF3R | | 92.24 | -0.86 | -0.16 | 95.44 | 1.77 | 0.33 | HY |
| WLZTZJ | | 86.40 | -6.70 | -1.24 | 83.40 | -10.27 | -1.91 | HY |

| Summary Statistics | Sample SN51 | Sample SN52 |
|---|---|---|
| **Grand Means** | 93.10 1000th ft-lbs | 93.67 1000th ft-lbs |
| **Stnd Dev Btwn Labs** | 5.43 1000th ft-lbs | 5.37 1000th ft-lbs |

Statistics based on 16 of 17 reporting participants.

## Comments on Assigned Data Flags for Test #348

6PQX9F (X) - Data for both samples are low. Possible Systematic Error.

## Key to Instrument Codes Reported by Participants

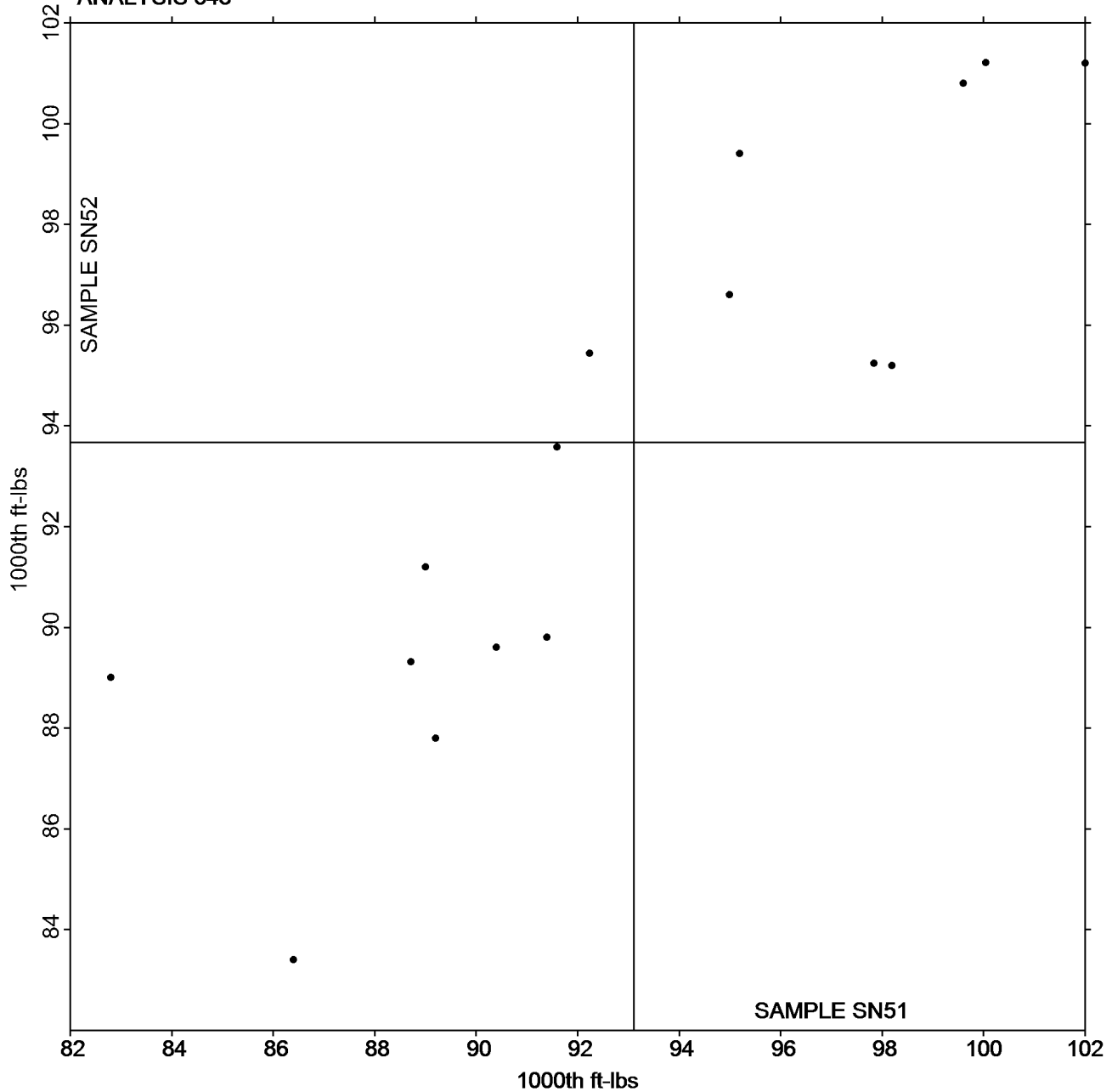| | | | |
|---|---|---|---|
| HY | Huygen Digitized Scott Internal Bond Tester | HZ | Huygen Internal Bond Tester with AccuPress |
| KR | Kumagai Riki Kogyo Internal Bond Tester | TM | TMI Internal Bond Tester |

**Paper & Paperboard Interlaboratory Testing Program**
Analysis 348
**Internal Bond Strength - Modified Scott Mechanics**
**TAPPI Provisional Test Method T569**

**Report #2921S,
January 2018**

**Grand Mean Sample SN51 = 93.103**
**1000th ft-lbs**

**Grand Mean Sample SN52 = 93.674**
**1000th ft-lbs**



ANALYSIS 348

SAMPLE SN52

1000th ft-lbs

SAMPLE SN51

1000th ft-lbs

If fewer than 20 laboratories are included in an analysis, a control ellipse will not be drawn on the two-sample plot.

| WebCode | Data Flag | Sample SP51 | | | Sample SP52 | | | Instr Code |
|---|---|---|---|---|---|---|---|---|
| | | Lab Mean | Diff from Grand Mean | CPV | Lab Mean | Diff from Grand Mean | CPV | |
| 3DYPBL | | 97.80 | 13.90 | 1.34 | 99.00 | 15.21 | 1.38 | TM |
| 3HYM2E | | 89.60 | 5.70 | 0.55 | 89.20 | 5.41 | 0.49 | SC |
| 62KB9C | | 73.57 | -10.34 | -1.00 | 74.33 | -9.46 | -0.86 | TM |
| 7E69PZ | | 65.40 | -18.50 | -1.79 | 65.92 | -17.87 | -1.63 | TM |
| CA9CPM | | 92.20 | 8.30 | 0.80 | 94.00 | 10.21 | 0.93 | TM |
| DEMKEY | | 78.42 | -5.48 | -0.53 | 77.94 | -5.84 | -0.53 | XX |
| GJL7UR | | 93.60 | 9.70 | 0.94 | 94.20 | 10.41 | 0.95 | XX |
| GXK27X | | 68.24 | -15.67 | -1.51 | 64.72 | -19.07 | -1.74 | TM |
| PVLNYX | | 87.00 | 3.10 | 0.30 | 84.80 | 1.01 | 0.09 | TM |
| Q3LC8N | | 84.32 | 0.42 | 0.04 | 84.66 | 0.87 | 0.08 | XX |
| UYGR3F | | 85.68 | 1.78 | 0.17 | 86.66 | 2.87 | 0.26 | XX |
| VGNPC3 | X | 0.07 | -83.84 | -8.11 | 0.07 | -83.72 | -7.62 | TM |
| XX3QDH | | 91.00 | 7.10 | 0.69 | 90.00 | 6.21 | 0.57 | XX |

| Summary Statistics | Sample SP51 | Sample SP52 |
|---|---|---|
| **Grand Means** | 83.90 1000th ft-lbs | 83.79 1000th ft-lbs |
| **Stnd Dev Btwn Labs** | 10.34 1000th ft-lbs | 10.99 1000th ft-lbs |

Statistics based on 12 of 13 reporting participants.

## Comments on Assigned Data Flags for Test #349

VGNPC3 (X) - Extreme Data.

### Key to Instrument Codes Reported by Participants

SC    Scott Internal Bond Tester (Manual)     TM    TMI Monitor/Internal Bond Tester

XX    Instrument make/model not specified by lab
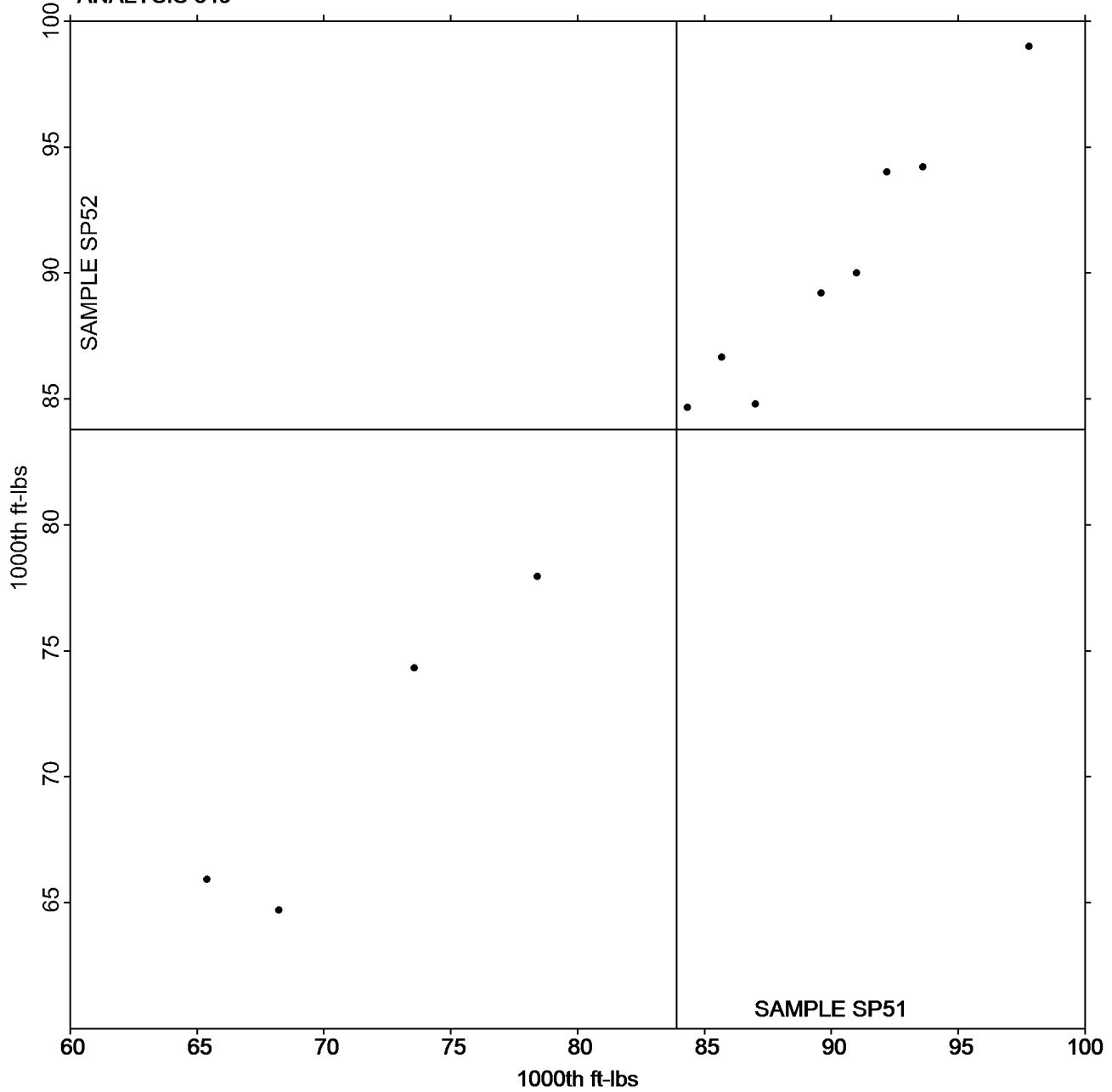
**Paper & Paperboard Interlaboratory Testing Program**
**Analysis 349**
**Internal Bond Strength - Scott Bond Models**
**TAPPI Provisional Test Method T569**

**Report #2921S,**
**January 2018**

**Grand Mean Sample SP51 = 83.902**
**1000th ft-lbs**

**Grand Mean Sample SP52 = 83.786**
**1000th ft-lbs**



ANALYSIS 349

SAMPLE SP52

1000th ft-lbs

SAMPLE SP51

1000th ft-lbs

If fewer than 20 laboratories are included in an analysis, a control ellipse will not be drawn on the two-sample plot.